THE

ELECTRICAL REVIEW.

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ELECTRICAL REVIEW.

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(J. A. BERLY'S).

1909 EDITION

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ENGINEERING EDUCATION AND STATUS.

THE unsatisfactory status of the engineer arises very largely from the fact that so far he has had no definite course of training. It is certain that were such a definite course to become obligatory, many men who go through some kind of training to-day would be debarred from becoming engineers; for a definite training to end in some such diploma as would be equivalent to the M.D. of the medical profession would be somewhat expensive, considerably more expensive than present training schools, which are, more or less, in competition with each other to acquire pupils. In much that is written concerning engineering education, the greatest factor of all is overlooked, namely, the parental ability to pay. Engineers hitherto have entered the profession by very various doors. One man becomes a premium pupil of, say, a locomotive superintendent. He may be entirely neglected by his chief, and may idle his time away. Again, he may be looked after and may be a worker. In either case, his chances of obtaining a billet are better than those of the smaller premium man, who is merely indentured to the railway company. Or a man may be a pupil of a locomotive company, and he will be helped to a colonial billet, and wet-nursed when in it, for he very naturally sends orders to his old company, who see to it that he comes through with credit. His specifications are simple copies of what he has received from them. Then there is the man who goes as pupil to some firm who do not take paying pupils. He has to keep shop hours; he learns to work, but does not profit much by any influence exerted in his after life.

Some men in the early days had, and others had not, a previous college training. The more strenuous of them studied by themselves in the evening after work. Then came the era of the technical college, and men were flung into practical work with no experience of practical tools or appliances, so that large numbers of men in responsible positions have, perhaps, hardly held a hammer, and have never seen anything of shop work. Others, after college, have spent some time in works. But many men have gone straight from Finsbury to the switchboard, whence they climb, or try to climb, into chiefs' places.

All are engineers, and each can probably point to some man similarly trained or untrained, whose pecuniary success is held to give the hallmark to his special line of upbringing. Engineers of no technical ability and very little training may do well in a business way and climb to great glory as employers of competent assistants; but though "business," pure and simple, is the most paying profession of all, it never seems to occur to such men to dub themselves "business men." They all become engineers. The daily Press usually prefixes the adjective "great" if the man is wealthy. This is one of the drawbacks to an open profession.

No man visits his lawyer or doctor except with the sure and certain expectation of paying a fee. The man in a close profession can get his fee, but in an open profession it is often difficult. A firm of lawyers had the impertinence to tell an engineer of long experience, who was both an A.M.Inst.C.E. and a M.I.E.E., that he was not entitled to more than a guinea for a day in Court. He was, they said, merely a mechanic.

Such impertinences arise out of engineering being open, and from the apathy of the engineering societies, which afford no help to their members in these matters. They do not even fix a scale of minimum fees to be exacted beforehand. Were this done, members would find it easy to ask them, and the existence of such a rule would have its influence on taxing masters.

It has been suggested that, following the example of the medical and legal professions, an Engineering Council should be formed, including representatives of all the leading engineering bodies, but otherwise independent of them, and that this authority should be invested with powers analogous to those of the Medical Council and the Law Society, in all matters relating to the status, emoluments and etiquette of the engineering profession. The proposition deserves serious consideration, and we hope to return to it at an early date.

Steel or Brick Chimneys?

The recent report of the Dublin United Tramways shows an expenditure of £1,200 on lining one of the steel chimneys with ferro-concrete to protect it from corrosion. The other is also to be lined. These steel chimneys originally cost less than a third of what they would have cost in brickwork, and they have cost so much since in painting. Does the initial cost, the present outlay on linings, and the capitalised value of the periodical painting represent the initial cost of a brick chimney? It should not be forgotten that a cheap chimney will give the necessary draught at a small initial cost, and it may be financially sound to compel a chimney to pay for its own subsequent improvement. In bad times, on the other hand, there may be a temptation to delay painting a steel chimney until it flakes off into rust, so that in time the chimney requires total reconstruction. Careful and timely painting should, however, preserve ironwork indefinitely. There are bridges still as sound as when new, externally, that have been exposed for half a century to salt winds and to rain.

Life-guards for New York Cars.

The Schenectady "fender and wheel-guard" trials, at which a British trigger-type guard ran off with the highest marks, are being followed by an examination of the officials of the street railway companies in the area of the first district of the N.Y. Public Service Commission, and we gather, from the report in the *Electric Railway Journal*, that a very poor defence was put up by the companies which use the ineffective projecting fender. This type of life-guard has been condemned for British use by the Board of Trade from the very beginning of electric traction, and the views of the Board's advisers are now seen to have been thoroughly sound. It is true that for some years an equally ineffective device, which was rather a body-mangler than a life-saver, was tacitly allowed by the Board of Trade, but we believe and hope that none of those rigid trays attached to the truck are in use at the present time.

The admitted difficulty in the States is the uneven nature of the track surface, but that should not be allowed to stand in the way of what one witness before the Commission called the sentimental notions which prevail regarding the sacredness of human life, and rough track would act as prejudicially upon the American as upon the British type of fender.

It is satisfactory to witness the adoption by the Americans of another piece of wholly British tramway apparatus, although, with an unfortunate lack of liberality, the Americans hesitate to acknowledge their indebtedness to us. We have learnt so much from them without shame, and with gratitude, that we hail with pleasure every occasion which enables us to return the compliment.

Copper.

The steady (or from the selling point of view "stagnant") nature of the copper market is shown by the monthly returns as set forth by Messrs. Merton in their circular for February 27th. The price was then quoted as £52⅛, and the visible supplies at 52,295 tons. Imports from N. America are down, but Chilian and Australian shipments are well maintained. Deliveries, at 25,293 tons, are ahead of total supplies, 24,653 tons, showing the stocks on hand. The *Financier* of the same date, reviewing the situation, attributes low prices in some measure to the action of the Steel Trust which, in lowering its prices, has affected metals generally, and also to an unsettled question of tariff reform. The large visible supplies militate against a rise, and restriction of output has, apparently, only marched with restriction of demand. The general opinion seems to be that copper will continue low pending a marked trade revival in Europe.

The Electrical Benevolence Dinner.

We informed our readers some weeks ago that a movement was on foot for increasing the financial resources of the Electrical Trades Benevolent Institution, with a view to making funds available for helping electrical trade employés of certain classes who have, after years of service, been overcome by misfortune. Circulars announcing the First Festival Dinner of the Fund are now issued, and we desire to claim the interest of all of our readers on behalf of the matter. The event takes place at the Whitehall Rooms of the Hotel Metropole on Tuesday, March 30th, with Sir Wm. Preece—who has shown a very active interest in the movement for some time past—as chairman. A great effort has been made by the Special Committee appointed for the purpose, to ensure the availability of a considerable sum of money for presentation on the occasion, but they have only been able to touch the fringe of the large numbers of men engaged directly in connection with electrical engineering industry who have both the means and the disposition to help those of their own cult who are in need. It is also thought that there are others less directly interested, who supply raw material for the construction of electrical manufactures, or who are large users of electric light and power, telegraph, telephone or signalling apparatus, who, if they were to weigh the merits of the case fairly and fully, might feel under an obligation to assist. We hope that from all directions there will come such a generous response that the Fund will be put upon a very firm basis straightaway. For the interest of those who may not be quite familiar with the objects of the Fund and the arrangements that are being made, we shall be pleased to forward particulars if they will communicate with us. At the moment we may mention the following benefits attaching to donations or subscriptions:—

1. A single payment of £1,000 entitles the donor to found and name a permanent pension of £40 per annum, with nomination without ballot during donor's lifetime.
2. All subscribers of £100 in one payment become Life Governors with 10 votes in each year.
3. Any firm, Corporation or Association is entitled to one vote per £1 given. Donations of £100 entitle them to nominate a Governor for 10 years with 10 votes in each year.
4. All subscribers of £10 and upwards, in one payment, become Life Subscribers with one vote in each year for each £10 subscribed.
5. All subscribers are entitled to one vote for every £1 subscribed.

THE REPORT OF THE TARIFF COMMISSION ON THE ENGINEERING INDUSTRIES.

(*Continued from page 373.*)

Turning to the classified sections of the Report, we learn that in the locomotive branch "the imports are negligible." On the other hand, we find that the exports increased from £713,000 per annum during the five years, 1875 to 1879, to nearly £3,500,000 in 1907. This increase is in the region of 500 *per cent.*, a fact upon which the Report offers no comment. There has been a gradual rise in wages, attributed by some witnesses to the action of Trade Unions.

South America accounts for about three-fourths of the increase to foreign countries, and India is also a very important customer, in fact, the most important British market overseas.

The home trade is confined to special work as the British railways build nearly the whole of their own standard engines. Thus there is very little encouragement for the independent locomotive builder to launch out.

"In regard to Germany, where the demand for locomotives has greatly increased, the position of the manufacturer is said to be strengthened by the fact that the State, which owns the railways, encourages the building of locomotives by private companies." Touching on the question of quality, the report says:—"United States locomotives are not held to be equal to the English." An American engine of standard pattern, "taken off the shelf," would cost 15 to 20 per cent. less than ours, built to British specification; but if the United States makers had to build to British specification they certainly could not compete with us.

As regards stationary engines, the imports from both Germany and America show a remarkable falling off, notwithstanding the importation of Sulzer and Allis engines for electric generating stations. In view of the official figures, there appears to be very little justification for the statement in the report:—"The evidence indicates considerable and successful German and other competition." When we turn to the actual figures of imports, we find that whereas in 1904 Germany sent us £309,000 worth of engines, the figure had fallen to £61,000 in 1907—almost exactly *one-fifth*. Turning to the United States, we find that whereas in 1900 she sent us engines valued at £249,000; the value had fallen to £49,000 in 1907, again almost exactly *one-fifth*.

In the hydraulic machinery section manufacturers complain of the unprofitable state of things; but it does not appear to be owing to foreign competition, for we learn that "the United States hydraulic engineering firms who established themselves in London and imported their steam and other pumps largely into this country have 'retired from the contest' owing to the keenness of competition."

The motor-car business has been continually expanding, and cars can now be produced more cheaply in England than abroad. For example, the English made taxi-cabs recently put on the London streets were better and cheaper than those imported from France. "At least 90 per cent. of the cost of a motor-car," says the report, "is for labour pure and simple," and "every motor-car in use, *whether imported or manufactured in the country*, increases the amount of skilled and unskilled employment." (The italics are ours.)

The motor-car industry has laboured under the disadvantage that the British working classes are slow to move from one form of industry to another, but "latterly it has been aided in securing the necessary mechanical labour for an expanding trade by the discharges from Woolwich Arsenal." This forms an interesting side-light on the discussion stirred up by the Protectionist Press on the discharges from the Government workshops. It seems clear that the dearth of labour has prevented a more rapid increase of the motor-car industry, so we can hardly complain under the circumstances against the importation of foreign cars. In 1907 we exported motor-cars to a value of £1,325,000.

As regards machine tools, it is the opinion that the importation of machine tools has diminished, although some witnesses say that they *cannot get English-made tools* so good in design and quality as the American-made article.

As regards agricultural machinery, manufacturers complain of dumping, and say that a 15 to 20 per cent. duty would enable them to command the home trade at prices *little, if any, in excess of those obtained at present.* Of course the foreigner would pay the tax, as usual. In view of the complaint of dumping, it is interesting to note that the value of our imports of agricultural machinery in 1907 was £770,000, whilst our exports amounted to £2,155,000. Of this, 90 per cent. went to foreign protected countries—Russia, Germany, France, Italy and South America.

From the report, we learn also that the German, Russian, and French tariffs have proved most harmful to some classes of textile machine makers, in fact, the German duties "have killed to a great extent the German trade of one manufacturer." In some classes the 45 per cent. American duty is "an absolute obstacle." We don't quite know what it means to be "killed to a great extent"; probably "half-killed."

Turning to the tables, we find that the exports of textile machinery in 1907 were £8,039,000—about 60 per cent. more than the average for 1900-5. The imports were £229,000, or about *one thirty-fifth part of the value of the exports!* We are still wondering what "killed to a great extent" means.

Turning to the structural steel department, we find bitter complaints about the "dumping" of American, German and Belgian rails, joists, &c. This is one of the few cases in which there is evidence to substantiate the complaint. When, however, we turn to the tables of imports and exports, we find that whilst in 1907 we imported £575,000 worth of steel girders, beams, joists and pillars, we exported almost double this value, viz., £1,004,000. Moreover, whilst the imports were about 30 per cent. lower in 1907 than in 1904, the exports during the same period *rose by 145 per cent.*, the figures for 1904 being £410,000.

And now we turn to the electrical industry, which, to us, is, of course, the most interesting section. As the report truly says, Great Britain is "the home of the electrical industry," the dynamo, the arc lamp, the electro-magnet, the Swan lamp, and the induction coil, having all had their origin in this country. We agree with the Report when it complains that progress was hindered for many years by legislative restrictions, which permitted foreign manufacturers to profit by British initiative and capital. We agree, too, that British manufacturers are often most unfairly treated in the matter of public tenders. Conditions as to rates of wages, hours of working and other details of works management are specified; their conditions, in the case of a British manufacturer, are rigidly enforced, whilst if a foreign firm secures the order, the whole of these restrictions are disregarded. Longer hours are worked, lower wages are paid, and practically every condition which would tend to make the British tender higher than the foreign is ignored. No one can defend a system so unjust, so immoral, so un-English. We are glad to find, at any rate, one point upon which we can agree with the Tariff Reformers, and if we could satisfy ourselves that the remedies they propose were sound, and for the lasting good of the industry, we should not hesitate to accept them and throw our lot in with theirs.

But, when the accredited Protectionist Press tell us that "Tariff Reform means work for all," when it is common knowledge that the unemployment problem has been as acute in America and Germany as here; that "Tariff Reform means higher wages for all," when it is well known that wages are, on the average, lower, and working hours longer in protected Germany and Switzerland, and that such highly protected countries as Spain and Portugal, are regarded as dying nations; "that the cost of living will be less," whilst "the farmer will get a better price for his corn"; and that the foreigner will pay the tax, when the evidence before the Tariff Commission itself absolutely disproves this, if, indeed, any one disproof were necessary: when the official organs of the protectionist movement make such ludicrous and wilfully misleading claims for Tariff Reform, we are quite justified in declining to admit the soundness of any other claims without critically examining the evidence on which they are based.

"In respect to labour conditions," says the report, "it is largely held by manufacturers that foreign countries have an advantage." This means that labour is cheaper in protected countries than in England. On another page (the pages are not numbered) we have the definite statement "labour is cheaper on the Continent." Upon what grounds then is it claimed that protection would increase wages here?

Again, we read that the action of British Municipalities has "more than anything else, been the making of the *German* electrical industry." On another page, however, we learn that the *British* engineering industry owes its expansion in part to municipal enterprise. Thus, "the expansion of British engineering is traced, in part, to traditional inventiveness, skill and enterprise; in part to the expansion of traction and other services by municipalities and private companies."

In another place, too, a similar expression occurs—viz., "The increase which has taken place appears from the evidence to have been stimulated by [among other causes] the development of traffic facilities by municipalities and other bodies." But let us test the first statement that British municipalities have "more than anything else been the making of the German electrical industry" by the actual data published at the end of the report. We find that the total value of the imports of German electrical machinery, including not only that for municipalities but for every conceivable purpose, has never in one year exceeded £228,000. Even if we include cables, lamps and all accessories, the total is only £654,000, of which municipalities take but a fractional part. No one but a Tariff Reformer would contend that this had been the main factor in building up a German industry employing, according to Mr. Garcke, considerably more than 300,000 hands. It is the most obvious nonsense. If a German should claim that the British engineering industry had been built up chiefly by the action of Germans who imported British machinery, we should attach very little value to his opinion. And yet we sent Germany in 1907 machinery to the value of £2,366,000, or about ten times as much as the value of our imports of German electrical machinery. Yet the German tariff is said to be prohibitive. Turning again to the report, we find that it is estimated that British municipalities spend about 1½ millions per annum for electrical plant, of which "not less than one-half, it is calculated, goes to foreign manufacturers, involving a loss of employment to 4,000 to 5,000 skilled workmen." Now the average value of the whole of the imports of electrical goods and apparatus for the last five years is approximately £1,000,000, hence, according to the statement quoted above, more than three-quarters of our total imports must be for municipal undertakings, which is manifestly absurd. According to Mr. Mordey's investigations, the percentage of foreign plant in British central stations is less than 5 per cent. Whilst on this subject, it may be as well to say that although we imported annually during the last five years an average of £1,000,000 worth of electrical goods, we exported an average of almost £3,000,000, the figures for last year being close on £3,500,000.

(*To be concluded.*)

CORRESPONDENCE.

Letters received by us after 5 P.M. on Tuesday cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.

Manufacture of Calcium Cyanamide.

I notice in your review of Mr. John B. C. Kershaw's interesting book on "Electro-Metallurgy," which appeared on the 26th ult., you state that "Calcium carbide does certainly unite direct with nitrogen, but for successful working a catalytic agent such as calcium chloride is required, a fact not mentioned in the text."

Will you permit me to point out that your statement without qualification is somewhat misleading, as it is by no means proven that a catalytic agent is indispensable, and your selection of calcium chloride as an instance of the requisite agent is unfortunate, as this, though used in the German "Stickstoffkalk" for some time, has been given up owing to the increased hygroscopicity of the resulting product. Recent experience in the Italian and German works has shown that no catalytic is required beyond the addition of a small proportion of the manufactured cyanamide.

Calcium fluoride, magnesium carbonate, silica, &c., as well as calcium chloride, have also been used as catalytics, the first-mentioned giving the best results in nitrification when present in small percentage in the carbide itself.

Henry E. P. Cottrell, A.M.I.C.E.

London, S.W., *March 4th*, 1909.

Combined Track Circuit and Cab Signalling.

Unless you have closed the discussion on Capt. Gardiner's letter on "Combined Track Circuit and Cab Signalling," I should deem it a favour if you would allow me a small portion of your valuable space, in order to rectify a wrong impression conveyed by Capt. Gardiner in his letter appearing in your issue of the 26th ult.

In the letter above referred to appears the following: "The advantages of continuous signalling are, in the first place, that the dangerous snare of a signal on the locomotive that depends upon the correct working of an apparatus at certain points in order to remove a previous 'clear' signal, and, if necessary, substitute a 'danger' one, is avoided." At first sight the incorrectness of this statement may not strike the casual reader, even if he be informed on the subject; but the man who is seeking enlightenment on this new departure in railway signalling cannot but understand that the cab signal generally, as referred to by Capt. Gardiner, will allow of the removal of the "safety," or "all right," signal without the compulsory substitution of the "danger" signal, and he will also infer that under certain conditions the "danger" signal may not be given when really required. In the "Driver's Cab Signal," as used by the Great Western Railway and other well-known companies, such a state of possibilities does not exist.

The "ready to receive signals," or normal position of the apparatus in working order, is only maintained by considerable magnetic force, and it is impossible to change the position of the apparatus from the "ready" position without giving a permanent "danger" signal, that can only be removed by the driver himself. The "safety," or "all right," signal is entirely independent of any of the foregoing actions, and consists in the ringing of a powerful gong in the cab, no other part of the apparatus being operated; in few words, the "all right" signal, in addition to the ringing of the "gong," consists in the prevention of the "danger" signal, or the maintenance of the apparatus on the "ready" or "normal" position, the driver only being able to stop the gong sounding. The danger signal is given by a shrill steam whistle, and by the dropping of a tablet bearing the word "danger."

It is evident that separate and distinct signals are received for "safety" and "danger," and that the normal position of the apparatus does not denote "safety," but only so with the addition of the gong ringing, and it must, therefore, be quite clear that Capt. Gardiner has misinterpreted the working of the "Driver's Cab Signal."

This is the more strange because he must be well aware that in the "Driver's Cab Signal" the "safety" signal cannot be removed to give the "danger" signal, because "safety" is not the normal position of the apparatus, and is just as distinct a signal as is "danger," and that the "danger" signal will always be given unless the signalman restrains it by pulling "off" the corresponding semaphore, or lever, the result of so doing keeping the apparatus in the "ready" position, and in addition causing the gong to sound until stopped by the driver only.

The contacting device used in the "Driver's Cab Signal" is no more likely to become out of repair than the locomotive itself, and therefore still permits the putting of the old catch question: "Which is the weakest part of the engine?" Answer: "Nowhere!" But should the device be removed

bodily by some unforeseen circumstances, the only result will be the shrill blowing of the "danger" signal.

The ground equipment or ramps, being immovable and as firmly secured as the rails themselves, are no more likely to be injured or destroyed. If the railway system fails, then, it is just as likely to fail by means of carriages, rails and locomotives as by the signalling apparatus; and I make bold to say that at the present moment there is no railway, which has not adopted the driver's cab signal, that is in that enviable position to-day. It is difficult to understand wherein lies the "dangerous snare" referred to by Capt. Gardiner, unless he refers to his own interpretation and explanation of the "cab signal."

If it is a "snare" to provide a driver with undeniable evidence of the position of the "stop" signal in advance, no matter what the climatic conditions, and to point out in the densest fog the position of the distant signal and its signification, then the "cab signal" is a "very dangerous snare"; and it really matters little what we call it, so long as it provides for the safety of the public and ensures the economical and punctual running of the trains.

E. C. B.

Illuminating Engineering.

I have been most interested in the reports of the formation of a new society, namely, the Society of Illuminating Engineering. The possibilities of such a body are enormous, but it would seem doubtful whether the British public will allow itself to be led by the nose as are their American cousins when the rope is held by the Illuminating Engineers. I think the promoters of the scheme would have been more successful had they had the forethought to embody in their executive committee the leading representatives of the electric lamp manufacturers. Although I, personally, have no claim to regard myself as one of the latter, it is obviously desirable that in such an association, practical men should have some say as to the course of action pursued. Also, may I ask where our central station engineers come in? It is surely high time that *publicity* was given to the names of the members of the executive. If that list does not contain the manufacturer and the central station engineer what hope, I ask, is there that this society shall become a power in the land, and if there is none, would it not be a favourable moment for the manufacturer and the station man to unite, say, to form a Society of Lighting *Engineers?*

United.

March 4th, 1909.

Fibre as an Insulator.

Several letters have appeared lately in your paper on this subject, and as some interest appears to be taken in the matter, I am venturing to send the following account of a case which came under my personal notice. In a power station near Manchester, it was thought advisable to make insulated covers to slip over the contacts of certain "selector" switches. These covers took the form of a rectangular box about 9 in. long and 2 in. wide and deep. One was made and placed over the two contacts of a switch with a P.D. of 550 volts across these contacts. Shortly afterwards the switchboard attendant noticed that it was smoking. On drawing it off, it was found that an arc, half an inch long, could be maintained by the current passing through the fibre. The box was carefully dried and replaced, and, though improved at first, rapidly returned to its former condition. This was in a warm, dry engine-room. Ebonite boxes were afterwards made and gave complete satisfaction.

J. H. S. Fildes.

Mobberley, *March 6th*, 1909.

A New Wiring System.

I have read with considerable interest the many expressions of opinion on the various systems of wiring, but there has not yet been suggested a practical system which shall be at once cheap and efficient, and so afford an opportunity of competing with our friends of the gas industry on a more equitable basis. It is, of course, obvious that if we were able to make full use of an uninsulated (not earth) return, the cost would be enormously reduced, and I have yet to hear of a really valid objection to its employment. But things must be faced as they are, not as we may desire them, and with this idea in view I have devised a system, to recite all the advantages of which would fill a column, so I will content myself with setting forth a few of them as follows: It is fireproof, waterproof, and condensation proof; as cheap as, if not cheaper, than lead-covered wire; easy to erect, sightly in appearance, and has no screwed or "dry" joints either in the conductor or outer metallic covering. It is adaptable, requires no elbows or bends, and only two types of boxes; is available for both surface and sunk work, and takes up very little room. Further, the accessories ordinarily required may be considerably reduced in size and cost. It can be used with equal advantage for either insulated or bare return, in the latter case at approximately 50 per cent. less cost. I have reason to suppose it would show a higher insulation test than the best screwed tube installation; I shall be pleased to give fuller particulars to anyone sufficiently interested to inquire through you of

Wireman.

London, S.E., *March 5th*, 1909.

An Overcrowded Profession.

I have read "Ohm Sick's" letter in your issue of February 19th with much interest. I assure him I can heartily sympathise with him myself.

My own plight, however, I think seems rather more hopeless, inasmuch as I have been out of a post nearly nine months, and all the efforts on my part since June last have failed to secure me a berth, even at a living wage. Despite the fact that I have tried every means my brain could devise, viz.: I have advertised in the leading engineering papers. I have written to over one hundred firms in this country and abroad. I have answered any advertisements in the leading engineering papers in which I thought I should stand a chance of securing the post. I have called personally on several firms. I have registered myself with one or two reliable employment agencies.

I have had a good training and experience, which has cost me several hundred pounds. A brief summary of this is as follows: I commenced my career by apprenticeship, as a pupil for three years with an old-established and well-known electrical manufacturing firm. On the expiry of my apprenticeship I secured a post with a prominent firm of consulting engineers as junior assistant engineer; I served the firm in this capacity one year, when I was promoted to chief assistant, and held this post for one and a half years, terminating in June last. In order to attain proficiency on the theoretical side, I have attended a technical institute for the past five years, and as the result hold several certificates. I had a good general education, finishing with three years at a well-known college, before serving my apprenticeship. I can produce good testimonials from all my employers. During the last nine months I have made it a rule to read at least three hours a day, in order to keep well acquainted with electrical progress.

The net result is that I have been out of work nine months; all rational methods to secure a post have failed. I am now come to the end of my tether.

What shall I do?

J. S. B.

Durston, *March 6th*, 1909.

With reference to "Adsum's" letter in your issue of March 5th, 1909, I might say from personal experience that his remarks are in no way exaggerated, and it cannot be too clearly pointed out to any young engineer who intends to apply for a junior assistant engineer's berth that the fact of his having served a two or three years' agreement will, in all probability, be a deterrent against him when applying for another post; also his remarks about the testimonial which he will receive are only too true. It rather takes the gilt

E

off the gingerbread when a junior assistant engineer has proved himself a good and reliable worker, to have a printed testimonial handed to him, which practically agrees in every detail with another junior assistant engineer's, who may have made serious and careless mistakes, and probably damaged machinery and been generally negligent during his term of agreement.

Apart from the remuneration during the term of agreement, a man who has proved himself reliable and is kept on after his agreement expires (and it will be generally found that the company employing the junior assistant engineer are not slow to pick out the smart men) should at least be paid a living wage instead of a mere pittance.

'Avinsum.

March 8th, 1909.

The correspondents who have written to you respecting central station salaries appear to have overlooked a very important feature, viz., that central station work is not subject to the fluctuations felt so severely by manufacturing and trading concerns, and therefore the stability of the appointments provided is some compensation for the slenderness of the commencing salaries and the slow rate of progress. I do not agree with your correspondent "Adsum" in his condemnation of companies as merely dividend-paying concerns, and therefore having a financial interest in paying low salaries. Municipalities are just as bad in the matter of salaries and have not even this excuse.

The truth is that many youngsters are permitted to gratify their desire to become electrical engineers, without counting the cost or period of the training required. Technical schools have multiplied to a remarkable extent, and until quite recently the electrical engineering classes were the most popular. With the exception of the higher technical institutions, the members of these classes were quite unable to face a period of no wages, and in consequence they have to accept anything locally which would provide them with employment and some trifling pay. The lower positions of central station work are filled with such men, who have not the means to move about the country or to support themselves whilst they obtain genuine engineering experience. Employers, whether municipalities or companies, pay the lowest wage they can, and under present conditions they are right in doing so.

The suggestion made by "Electricity Supply" in your issue of February 26th to meet this state of affairs is a sort of secret society of junior engineers, who will keep a black list of central stations so that the members may be "warned off" in bad cases. What are the members of this society going to do in the not improbable contingency of all central stations being equally to blame?

The electrical engineering industry (or profession) is one which should not be entered by anybody who does not possess sufficient means to pay for a proper training and support himself for seven years, and the sooner this fact is appreciated by those unfortunate people in the lower middle classes, who imagine that the municipal technical school will do all that is necessary, the better for their children and for those who are already suffering from over-competition.

Layman.

March 6th, 1909.

With further reference to "Ohm Sick's" letter of February 19th, *re* the above, I note he states "probably a man has spent £600 to £700 for his college training, &c." This would appear to me an exceptionally high figure, but following the words of the old adage, "Fools and their money are soon parted," thus perhaps it is easy to understand that "Ohm Sick," at the age of 32, finds himself a failure.

He seems to take great umbrage at the following advertisement—"Young gentleman, with previous experience, to train as chief assistant in a lighting station, premium 30 guineas; wages 10s. after 12 months"—and one of his subsequent remarks thereon is:—"The unfortunate who is fool enough to part with his 30 guineas is to be trained as chief assistant."

He confesses at the commencement of his autobiography that he parted with some £700 on his own training in a technical college and shops, therefore, we can only conclude that the man who parts with the large sum of 30 guineas is a bigger fool than he who parts with some £700.

The advertisement in question certainly requires "previous experience," but a workshop training of two or three years naturally would suffice; and as one could hardly look upon a youth with only that amount of experience as a wage earner, the 30 guineas he is asked to pay (£26 of which is refunded) is really being spent on his finishing course.

Amonyd.

The Maintenance of Large Gas Engines.

The discussions which were reported in your last issue on the relative value of the gas and steam engine for electrical generating purposes, cannot fail to be appreciated by those among your readers who are interested in the gas *versus* steam problem. It was, of course, imperative that the subject, dealt with as it was by some of the leading lights of the profession, should be confined to general or fundamental principles, hence, I suppose, the reason of their non-incursion into the thorny paths of detail; but (so far as a gas engine is concerned) I am almost constrained to submit myself to the ridicule of your readers and assert (paradoxically perhaps) that the details are the fundamentals.

Maintenance costs depend upon so many circumstances that the attempt at comparisons by generalities will be futile. I may say at the outset that all my observations are based upon actual working experience of three types of gas engine, viz. (1) Cockerill type gas engines of 1,000 H.P., driven by blast furnace gas; (2) Westinghouse vertical 350 H.P., driven by town gas; (3) the smaller Stockport types, driven by producer gas. The two latter types are so well known and so easily manipulated as to call forth no remark at present, beyond saying that their temporary failures are generally due to the essentials of such being too lightly treated by the operator. I refer to ignition, circulation and cleanliness of valves, &c., the cost of which failures must of course all be set down to maintenance.

The Cockerill type, on the other hand, is less known, and with more difficulty managed. Not so little known, however, as some of the speakers make out, for the impression one gets from reading the report of the discussion, is that they are altogether unknown in this country, whereas three of the largest iron and steel companies have gone far past the experimental stage, one company alone having over 6,000 H.P. installed, all being driven with blast furnace gas, and giving more or less satisfaction. The points I wish most particularly to emphasise, are the heavy cost of these engines for maintenance, and the many points of detail on which smooth and continuous running depends.

First, as to costs: an engine coupled to a 500-KW. generator, running regularly (that is, as regularly as it would run) during a period of 12 months, stopping only at week ends, and any other time it fancied, cost for repairs in labour alone, £250, £50 of which was actually paid to electricians for ignition upkeep; the year's output in B.T.U. was 500,000; repairs cost, in labour, works out at ·12d. This figure is high; the oil consumption is proportionately higher, and the space occupied is five times greater than that required by steam engines, or turbines of an equal capacity. Now, as to results, we got stoppages galore, gas failures, ignition failures, circulation failures, bearings hot, encroachment of circulation water into cylinders, &c., and at starting, wrong mixture (due to ever varying quality and pressure of blast furnace gas, fluctuations in calorific values, &c.), compressed-air shortages, damp plugs, &c. These, sir, are actual experiences in a gas engine power house, and I hold with you "that the future lies with the gas plant—but it has not yet merged into the present."

W. C.

Wednesbury, *March 8th*, 1909.

Electricity in Mines.

The original discussion was on "Electrical Fatalities in Mines," and if "Mines Electrical Engineer" refers to the second paragraph in my letter in your issue of February

26th, he will have no cause to use the words, "I need not say that no mention is made of these." I speak on the matter as a working colliery electrician in charge of the plant. He says he would trust any plant to the charge of a wireman who has had no shop experience. How would this man shape with a burnt-out machine, or turning up a commutator or slip rings, or rebushing a set of motor bearings, as is expected to be done by the electrician in charge at many a colliery or mine at home and abroad? I myself have had to alter work in collieries which was originally carried out under the supervision of a mines electrical engineer, who was more theoretical than practical.

I am quite aware that at the present time work in shops is specialised, but in the days of my apprenticeship we went through every department of the shop, and on outside installation and erection work also.

If our friend is content to attend to his own plant and work, and to abide by his manager's decision in all things, what would he do if his manager only had an elementary knowledge, or if he was asked to take charge of a plant which he found was not up to Home Office rules? Would he then be content to let it remain as it was, and let his manager take the responsibility?

A colliery electrician in charge of a plant is certainly responsible for the electrical work, and is paid to take that responsibility; else why is it a usual thing for a manager to give his electrician written authority to that extent, and receive his written acceptance?

If "Mines Electrical Engineer" had had some of my experiences, he would soon want to find out ways and means to prevent the class of men, who have the bounce to take responsibilities and trust to luck as to being found out as to their competence, and who have no conscience as to what might happen, being placed in the same class as himself.

Colliery Electrician.

I have read with very great interest, from time to time, the excellent articles appearing in the Electrical Review under the above heading, and I feel that a few remarks from a man having a practical experience of colliery working will not come amiss. I am in charge of a three-phase electrical plant of 1,500 H.P. for power and lighting, both above and below ground. I have held this position for a number of years, the colliery being a very progressive one, and during the whole time we have fortunately never had an accident from electric shock below ground.

I consider that this is chiefly owing to the efficient manner in which every job is put in, and also to the fact that every cable switchgear frame, trailing cable drum, and, in fact, all apparatus in connection with electrical work in the mines is efficiently connected to earth, reducing the danger from shock to a minimum.

One of your contributors, in a previous number, quoted the phrase, "A little knowledge is a dangerous thing"; granted so, in the case of an inexperienced man handling a shot-firing apparatus; but when handling a cable it is necessary to earth it as efficiently as electrical and mechanical means will allow, and let the colliers and mine men see that it can be handled with safety. Then, and not until then, will that superstitious fear that it will bite be removed.

Again, our system of inspection is as complete as it is possible to make it. The great difficulty in colliery work is getting just the right man for the job; a man that is not afraid of pitwork nor of reporting negligence, should cables be left lying about on the ground in the main roads or shunts, which have been brought down from their suspensions by falls of roof and are in danger of injury by tubs coming off the rails. He should not only be an electrician, but should understand mechanical work, so that he can examine and report on all gas-tight switchgear, motors, &c. What is the use of installing gas-tight apparatus if you have no proper system of inspection? Suppose an electrical engineer has specified for gas-tight switchgear, how is one to know that it has been erected gas-tight? Or take, for instance, a fuse on an underground coal-cutter circuit, where it is essential to place the gate end switch and fuse as near to the coal face as possible; the fuse blows, due to an overload on the cutter, and the cutter man has to replace the fuse.

Should he by some means or other fail to screw up the fuse-box lid square, the Inspector on his round would at once see the fault and report the same, when measures would be taken to prevent the same thing again occurring. One more remark—see that your electrical foreman is a man of sound mechanical training, has served his apprenticeship in some well-known works, and has been out erecting for his firm, and, in addition, has a fair technical knowledge. Theory without practice is a worthless commodity, but practice combined with theory in a man of sound judgment means the satisfactory working of your colliery electrical plant.

J. H. P.

March 8th, 1909.

Dublin Electricity Supply.

I was not particularly interested in the explanations of Mr. Ruddle in your current issue, but I caught a mention of West Bromwich, and looked for more.

When I found that West Bromwich was included in the "Metropolitan" area, and that the average price received for "juice" was 4·2d., I could see that your compositor had played you false, for at this fabulous price my annual revenue would be nearly equal to one-half on the capital expenditure, truly a "Utopian" figure.

I may explain that the average price for the year ending March last was only 1·64d., and West Bromwich is in the "Black Country."

I shall be glad if you will kindly insert this in your next issue, or the geographical position of West Bromwich may be misplaced.

W. A. Jackson,
Borough Electrical Engineer and Manager.

West Bromwich, *March 8th*, 1909.

[The error occurred in Mr. Ruddle's original letter, and unfortunately escaped our notice. No doubt the reference was to Brompton.—Eds. E.R.]

In your issue of the 26th ult. you have a leading article entitled "The Dublin Failure," and in the course of your criticisms describing the present position of affairs, the words are used: "And a not too creditable system of arc lighting."

We are not sure whether reference is made to the system, as a system, or to the behaviour of the lamps and apparatus which constitute the system, but in either event, as the contractors responsible for the arc lighting of Dublin, we think we may be permitted to ask for an explanation of what we consider an entirely unfounded remark. Will you therefore allow us to say that we manufactured and supplied 500 12-ampere double-carbon open-type arc lamps, together with complete equipments for raising and lowering, and erected these, as also the pillars. These were erected and put to work in 1903. Since that time there have been no complaints whatever, and, on the contrary, the installation has been spoken of in the very highest terms.

The lamps burn on an average 3,750 hours per annum, and the nightly number of extinctions from any cause is less than ½ per cent. Of these extinctions 99 per cent. are due either to carbons or trimming, and are regulated by the Corporation inspectors when going their rounds of the circuits; so that the total number of extinctions, that is to say, lamps out all night from any other than the above causes, does not amount to more than ·005 per cent. There have been no complaints of the street lighting received from the citizens; on the contrary, we understand that constant pressure is being put upon the Corporation to extend the system into other parts of the city which have not yet been reached.

In view of the above, we shall be interested to know what grounds the writer of your article had for referring to the arc lighting at Dublin as "a not too creditable system." We, as contractors, of course, had nothing to do with the planning of the system, but we fail to see how those responsible could have recommended any other system. Flame lamps were not available at the time, and an enclosed type of arc lamp would not have been suitable for the great majority of the Dublin streets. We are, however, concerned

with the quality and conduct of the lamps, and for that reason we have given you the foregoing information regarding the details of their burning.

Veritys, Ltd.
M. B. Cotterell, *Director.*

London, *March 3rd*, 1909.

As you state in the leader under the above heading in your issue of February 28th, the Dublin electricity undertaking is very heavily handicapped by over-capitalisation and poor design, involving a good deal of expenditure that should have been unnecessary. So long as you confined yourself to these facts, as set out in the reports of the Dublin Lighting Committee, and the Dublin City Treasurer and City Accountant, no one could take exception to your statements.

The tone of your comments does not, however, strike one as being very impartial or very ingenuous, and your figures do not seem to have even the elementary virtue of accuracy. For instance, you state that the works costs per unit are four times greater at the Corporation works than at the Tramway Co.'s station. This is a palpable misstatement. Take the year 1906-7, for which full published figures are available. The generating costs per unit generated at the Corporation works were 0·65d.; the generating costs per unit generated at the tramway station were 0·42d. The difference in the load factors more than accounts for the difference in the generating costs, as doubtless you are well aware.

I will take another comparison of works costs. The cost of coal in Dublin and London is not very different. But we find that the Dublin total works costs per unit sold are lower than those of the following London supply companies:—Brompton, Chelsea, Kensington, Notting Hill, St. James's, Westminster, and South London, although these London stations have a much higher power factor than Dublin. I have selected the companies rather than the local authorities, as you seem to have a peculiar fondness for them.

The average price of gas per 1,000 cb. ft. in the districts supplied by these London companies was 2s. 9d.; the average price for the corresponding period was 3s. 5d. for the city and 4s. 5d. for the townships.

I have nothing whatever to say against the Dublin Tramways Co., who furnish an excellent service. I cannot say quite the same regarding the gas company, as I pay 4s. 6d. per 1,000 ft. for gas (not being near enough to an electric supply cable), but I like fair argument, and do not think anything is to be gained by special pleading, unjust comparisons and distortion of facts.

A Dublin Ratepayer.

March 3rd, 1909.

[Mr. Ruddle's letter of protest in last week's issue strengthens our position materially.

What are we to say for a "business" for which it is necessary to plead in extenuation of enormous losses that half the accumulated deficit is due to the existence of capital which is not now represented by anything tangible, and that another large sum would not have been lost if the coal-masters had been complacent enough to keep down the price of coal?

The first charge was well known, and should have been anticipated, while nothing but a weak business could be hit so hard by a temporary rise in one of the raw materials.

As for Mr. Ruddle's comparison of the Dublin average selling price with the average prices of selected London stations, we were content to take, as reliable, the average figures of 25 *similar* stations given in the report upon which our article was based, not, however, as Mr. Ruddle suggests, without a very careful study of its contents, so far as they were at the time available to the public.

Mr. Ruddle, in putting aside our remarks about the utterly insignificant depreciation fund, which it is proposed to wipe out altogether, knows that he is running right up against our tenet that such a fund is necessary in spite of the natural fulfilment of debt obligations; and we put it to him that the existence of an adequate depreciation, or "obsolescence," fund might be the means of keeping the plant up to date in the years to come, when the present machinery will be obsolete but the capital charges on it still alive.

Had our space been less congested, the article of which Mr. Ruddle and our other correspondents complain would have been fuller, and, perhaps, plainer, but the issue raised was clear enough, and is simply the issue between sturdy individualism, and collectivism crawling on the crutches of the ratepayers.

In reply to Messrs. Veritys, it was not our intention to cast any aspersion upon either the quality or the conduct of their arc lamps, and we are quite willing to accept their statement that they have given satisfaction to the authorities in Dublin.—Eds. E.R.]

Municipal Trading.

I recently read that negotiations had been entered into by the Willesden Urban District Council with the North Metropolitan Electric Power Supply Co., with the object of effecting a reduction of the bulk supply charges by the latter. Four offers, it appears, have been made by the company during the last 12 months, and rejected by the Council. Finally, last month, the company, it seems, made an offer on the basis of an agreement for some 14 years, to which the Council has replied stating that it is not prepared to bind itself for so long a period, and has instructed the chairman and officials concerned to negotiate further with the company. Such a long period is certainly out of the question.

It seems a pity the Council sold its valuable station to the company, and then had to go to it for a bulk supply.

It will be remembered that the North Metropolitan Electric Power Supply Co., which works in conjunction with the Metropolitan Electric Tramways, Ltd., both companies being of the British Electric Traction Co., acquired the Willesden power station some six years ago from the Council. Parting with such a valuable and increasingly valuable asset seems inconceivable.

Willesden.

March 9th, 1909.

Polishing Commutators.

In reply to "Conocimiento," I would point out from actual experience that metal polish is beneficial when used for polishing commutators, and more advantageous than "Shinio," "Shinio" being of a gritty composition.

The method I have adopted and used with success, has been to first rub the "com." over with a little polish and benzoline, getting the dirt and grease off, then to wash it with benzoline only, finally polishing it with a dry rag.

This method ensures all dirt being cleaned away, and also gives a slight lubricant to the "com.," while the polish lasts several days.

W. P. H.

Fixation of Nitrogen in Norway.—The Stavanger District Council, according to a communication from Christiania, has unanimously decided to grant a concession for the utilisation of waterfalls in the Ryfilke and the Lysefiord in connection with the projected establishment of works for the recovery of nitrogen from the atmosphere. The application and plans for the purpose, which contemplate the use of 150,000 H.P. and the winning of nitrate on a new method, were submitted by E. Hansen, veterinary surgeon, on behalf of a foreign company which proposes to have a share capital of from 20,000,000 to 25,000,000 crowns. The Government is accustomed to deal with concessions in agreement with the vote of the District Council, which, in consenting to the application, has imposed certain conditions which, it is assumed, M. Frantzen, of Stavanger, on behalf of the promoters, will doubtless accept.

The White City German Section.—From a paragraph in the *North German Gazette*, quoted in the *Times*, there is no question of official German participation or of the corporate participation of German industry in the German Section of this Exhibition. The paper referred to emphasises the fact that the Exhibition is a private undertaking.

LEGAL.

Boyd *v.* National Telephone Co.

In the Chancery Division on Friday, Mr. Justice Parker had before him the action of Boyd *v.* the National Telephone Co. upon an interlocutory motion by which Mrs. Boyd claimed an injunction to compel the defendant company to remove a telephone pole from her premises.

Mr. Mark Romer, K.C., who appeared in support of the motion, said that in effect it was to restrain the company trespassing upon property of the plaintiff, situated in the Haunch of Venison Yard, Brooke Street, Hanover Square. Mrs. Catherine Boyd, the plaintiff, was the owner of a long lease of the property, and she discovered in February of this year that the National Telephone Co. had erected an enormous pole some 20 ft. high, on which were 19 iron cross-bars, which carried 3 very heavy cables and over 200 wires. The effect was to render the premises dangerous, as the wall to which the pole was fixed was only a 9-in. party wall, and it was rendered very unstable. It was a very old wall, and they were seriously afraid that the whole thing would come down. They did not know when it was placed there, and therefore he felt a difficulty in asking for a mandatory order to take it away immediately, but the trespass did not stop there. The defendants' workmen had from time to time, about three times a day, come on to the plaintiff's premises, which were empty at present but newly decorated, ascended the staircase for the purpose of getting on to the roof, and left hand marks all the way up. He was asking for an injunction to restrain that trespass and also the continuance of the trespass on the wall. It might be said as regards the former that an easy way would be for the plaintiff to lock the door. That had occurred to her, and she did lock the door, but a ladder had been thrown up, and they reached the roof in that way. That sort of thing, he submitted, ought to be put an end to as soon as possible.

Mr. Gaine, representing the company, said he was told the pole had been there for nine years.

Mr. Justice Parker said that did not give the company any rights.

Mr. Gaine said he did not know what their rights were, he had not had time to look into them.

Mr. Romer said that until recently the plaintiff let the premises, and the company might have obtained some rights from her tenant, but the company had not obtained the plaintiff's licence. She was quite unable to let the property. No one would take the premises, as there was a danger of the whole thing coming down with a run.

Mr. Gaine said he was told there was no danger at all.

Mr. Romer said that he did not know whether the defendants contended that they had a right to go on this roof.

Mr. Gaine said he did not know, as there had not been time to look into it.

Mr. Romer said letters had been passing between the parties since February 2nd.

After some discussion it was arranged that the matter should be brought for a speedy trial, and his Lordship said that he would fix Wednesday, March 17th, for the hearing, subject to any case part heard.

Zend Electric Lamp Manufacturing Co. *v.* Zossenheim.

The plaintiffs in this action, moved before Mr. Justice Parker in the Chancery Division on Friday last, for an interim injunction to restrain an alleged infringement of their letters patents by the defendant.

Mr. Colefax appeared in support of the motion.

The defendant appeared in person, and asked for an adjournment. In answer to the judge, he said he was perfectly willing to undertake to keep an account of his sales pending the motion being heard, and upon that undertaking the motion was directed to stand over for a week.

Mr. Colefax asked that any evidence that the defendant desired to put in might be filed by Wednesday, so that the motion might be effective next week.

His Lordship impressed upon the defendant the necessity of filing his evidence by Wednesday, and advised him to consult a solicitor.

The defendant thanked his Lordship, and intimated that he would obtain legal advice.

In re H. R. Jones, Wilson & Co., Ltd.

Before his Honour Judge Thomas, at the Liverpool County Court on Friday, the matter of Messrs. H. R. Jones, Wilson & Co., Ltd., electrical fittings supply dealers, of St. John's Lane, Liverpool, came before the Court a second time on the petition of the Siemens Bros. Dynamo Works, Ltd., Manchester.

Messrs. Siemens Bros. had applied for a winding-up order, but when the case was first before the Court the petitioners wrote that their claim had been satisfied. Neither the company nor the petitioning creditors therefore appeared, but Mr. Arthur Dean (solicitor), on behalf of other creditors, Messrs. Schiff & Co., carbon manufacturers, of London, supported the winding-up petition, and the matter was adjourned for a week for them to decide whether to apply to be substituted as the petitioning creditors. At the resumed hearing on Friday, counsel for Messrs. Schiff & Co., formally applied to be substituted.

Counsel, for Messrs. Wilson, submitted the technical point that his Honour had no power to substitute one creditor for another, unless the original petitioning creditor appeared in the case, the contention being that sending a letter to the Court withdrawing from the petition was not appearing in support of the petition. A recent decision of Mr. Justice Neville was quoted in support.

His Honour, following that decision, held that there had been no attendance of the petitioning creditor, and, therefore, he had no power to substitute. He granted Messrs. Schiff the costs of their attendance at the first hearing against the petitioning creditors.

Liverpool Corporation *v.* Ansoma Co., Ltd.

Before his Honour Judge Thomas, at the Liverpool County Court, on March 4th, the plaintiffs sued defendants, carriage proprietors, of Liverpool, for £1 10s. 5d. damage caused to an electric tramcar by reason of the alleged negligence of the driver of a motor-omnibus belonging to defendants. Plaintiffs' case was that on January 16th an electric tramcar, laden with football spectators, had left the corner of Walton Breck Road, and when it had travelled about 15 or 20 yards from the compulsory stopping place, the motor-'bus came up from behind, and when travelling at about eight miles an hour tried to cross the road from the off-side. The car driver had no idea of the approach of the motor-'bus, until it was abreast of the front platform. He then applied the emergency brake, but the motor-'bus continued its way across the road, and in so doing collided with the tramcar, carrying away the canopy pole and the step. The defence urged that the tramcar was stationary when the motor-'bus commenced to cross the road. His Honour found for plaitniffs, for whom he gave judgment with costs.

The Tramways of Buenos Ayres.

In the Chancery Division on Tuesday, March 9th, Mr. Justice Swinfen Eady had before him the petition of the Buenos Ayres Grand National Tramways Co., Ltd., and Mr. W. H. Harris for sanction to a scheme of distribution, as agreed between the different classes of shareholders of the company, of certain shares which comprised the consideration to be received for the sale of the undertaking to the Anglo-Argentine Tramways Co., Ltd. Mr. Younger, K.C., appeared in support of the petition.

His Lordship sanctioned the scheme.

The Electro-Peat Coal Co.

Last week for four days, also during the early days of this week, the action of Barber *v.* Mayo was heard by Mr. Justice Lawrance and a special jury in the King's Bench Division. In this action Mr. J. Crossley Barber, a Bradford dress material maker, of Moorfield, Ilkley, Yorks., sued the Earl of Mayo, of Co. Kildare, and other directors of the Electro-Peat Coal Co., for damages for alleged misrepresentation in a prospectus of the company, by which plaintiff was induced to invest in shares of the company. The defendants all denied the charges. They were Mr. F. Howard Allen, of Chester Square; Leslie Falkiner, of Co. Cork; Mr. Roger Walker, of Tidmarsh Grange, Reading; Mr. J. Macgregor and Col. T. Austin St. Quintin, of London; and Mr. Geo. Darlington Simpson (alleged promoter).

Mr. Isaacs, K.C., who appeared for the plaintiff, described the way in which Mr. Barber became connected with the company. He was introduced to the matter by a Mr. Wm. Walker, of Leeds, and a Mr. Bowden, in whom he had great confidence. Plaintiff first underwrote 1,000 shares, and subsequently another 1,000, and he had such confidence in the concern that he stipulated that he should have 500 shares allotted "firm." It appeared that in a report attached to the prospectus of January, 1904 (on which plaintiff subscribed), which was signed by Mr. Scoones, an engineering expert, it was stated that the new peat coal was to be "the coal of the future," and that it was "equal in calorific value to ordinary coal." It was also said that the directors would not go to allotment on less than 40,000 shares, and in a subsequent report it was said that over 40,000 shares had been so allotted. Later on it was found that an error had been made by comparing peat coal with ordinary coal when the amount on which the peat coal was based was that of the kilogramme, whereas the amount of the coal was 1 lb.—the result being to decrease the calorific value of the peat coal by 50 per cent. It was also found that of the 40,000 shares which had been applied for, some 15,000 had been applied for without any cash being sent with the application money, and 10,000 shares were applied for by a gentleman afterwards found to be a lunatic. In the result the company was in a moribund condition, if not actually dead, and plaintiff now sought damages for the money he had lost.

Plaintiff, in his evidence and cross-examination by Sir Edward Carson, who appeared for Lord Mayo, admitted that he did not charge Lord Mayo with fraud, nor did he say that he had put statements in the prospectus which he knew to be false. He was not aware that Lord Mayo had never received 6d. for directors' fees, had got no expenses and had lost money in the concern. He took Lord Mayo's word on those points. In further cross-examination, the plaintiff admitted that he had been a director of the Leeds Trust, Ltd., the Italian Petroleum Concessions, Ltd., and the Rio Rumiel Co., none of which had paid dividends. He also admitted that at Mr. Bowden's request he had allowed his shares

to be "pooled" for Stock Exchange purposes, and he further admitted that but for his shares being locked up in the pool he might have sold them at a profit. He did not know whether the prospectus of January, 1904, on which he subscribed, came from the syndicate or from anywhere else. When he subscribed to the company he was acting on the general representation made by Bowden as to what the company was going to do. He said it would be a good thing, and he relied mainly on Bowden's judgment.

Mr. A. E. Brown, public analyst, of Greenwich, Mr. W. Mc D. Mackay, and Mr. F. W. Richardson, another expert, were called and examined at some length on the question of the process for the conversion of peat into peat coal. They agreed that it would take 6 tons of wet peat to make 1 ton of peat coal, and that its value per ton would not be more than 5s. to 6s. per ton, instead of 9s. per ton, as the engineers had stated in the prospectuses. Reference was also made to the fact that when Mr. Scoones's report appeared, attention was called to the fact that an error had been made in the comparisons between peat coal and ordinary coal by using as a basis the kilogramme in one case and the pound in another, and that fact having been pointed out to the directors, Mr. Scoones's report was corrected in the later prospectus of April, 1904.

The case for the plaintiff having closed, Sir E. Carson for Lord Mayo, and the other counsel for the rest of the defendants, submitted to his Lordship that there was no case to go to the jury against any of them, and long legal argument ensued.

His Lordship said he had come to the conclusion that the best thing for all parties would be to allow the case to be tried out.

Sir Ed. Carson then opened the defence for Lord Mayo who, he said, was a representative peer of Ireland, and one who held the most coveted order in that country—viz., that of a Knight of St. Patrick. Lord Mayo had simply joined the board on the recommendation of an old brother officer, and because he thought by doing so he would do something to aid in the development of the resources of Ireland, there being 2 millions of acres of bog land which could be dealt with by this company. Lord Mayo never authorised the sending out of the prospectus of January for any purpose except to be submitted to Counsel for settlement. He never authorised it to be shown for underwriting purposes, and that being so, the charges of fraud made against him must absolutely fall to the ground.

On Tuesday, Sir Edward Carson, resuming his address on behalf of Lord Mayo, called special attention to the statutory meeting of the company held in August of 1904. At that meeting Lord Mayo told the shareholders that there had been questions raised in the Press as to the value of the Bessey process for making peat coal, and saying he was not an expert in such matters himself, he called on Mr. Scoones, Mr. Hales and Macgregor to explain matters. This they did, and Mr. Macgregor (who was a member of the firm of Johnson & Phillips, who supplied the machinery) said that he believed they had brought the machinery up to such a pitch that they could make the peat coal at or below 5s. per ton. Mr. Barker, the plaintiff, was present at that meeting, and though asked to express his opinion or to ask questions, he made no move. The fact was Mr. Barker was no infant in these matters. He was not a member of the ordinary ignorant public. He was one of a number of underwriters willing to trust to the statements made by Mr. Bowden and Mr. W. Walker, and to a draft prospectus shown to him by them, and he knew that if the thing was a success to the public, as he believed it would be, he would get his 11½ per cent. on his money. But to suggest on these facts that Lord Mayo was guilty of fraud was absolutely absurd. Lord Mayo did his best in the interest of the company and the shareholders; he had not a shilling of interest in it in any way; but, like others, he had lost the money he put into the company; and he should ask the jury, having heard the evidence, to say that there was not a shadow of a foundation for the charge made against his client.

Mr. M. Barnett addressed the jury on behalf of Mr. F. Howard Allen, one of the directors.

Mr. Norman Craig next addressed the jury on behalf of Mr. J. Macgregor, who was a managing director of the firm of Messrs. Johnson & Phillips, one of the largest and best known and reputable electrical firms in this country. This firm had a capital of somewhere about half-a-million, and at its works at Charlton it employed some 1,000 workmen. The motives of Lord Mayo and Sir L. Falkiner in being connected with the company, seemed to have been the philanthropic idea of relieving the "distressful country," to which his learned friend Sir E. Carson belonged; but Mr. J. Macgregor's connection with it was simply a commercial one. When the company was first started, Mr. Macgregor was asked to supply electric plant, and he eventually devised machinery which was very successful. But the net result of the connection of Mr. Macgregor's firm with the Peat Coal Co., was that Messrs. Johnson & Phillips had a bill against the company, which they had no means of paying, of some £8,000. In addition to that, Mr. Macgregor had lost the money which he had put into the concern, so that the total result of that which was alleged to be Mr. Macgregor's first attempt at "swindling," was a loss to himself and his firm of some £10,000. The charge against Mr. Macgregor on the prospectus of January was baseless, as the fact was that the directors who passed that document did so only for the purpose of submitting it to counsel, and with no idea that it would be hawked about by people in order to get underwriting.

Mr. J. A. Simon next addressed the jury for Sir L. Falkiner, who, he said, joined the company simply as an Irish gentleman interested in the development of Irish land, and, like the others, had lost all his shares in it, and had made no profit out of the company from first to last.

Mr. J. D. Crawford also spoke for Col. St. Quinton.

Mr. Low was about to open for Mr. Roger Walker, when Mr. Isaacs said, on behalf of the plaintiff, he wished to withdraw the case against Mr. Roger Walker.

Lord Mayo was then put into the witness box, and in reply to questions from Sir Edward Carson, he said Col. St. Quinton introduced the matter to him in the winter of 1903-4, and he went down to Charlton and saw a demonstration of the process at Messrs. Johnson & Phillips's works. He still thought it was a wonderful invention. He agreed to become a director in April, 1904, but he had nothing to do with the syndicate that promoted the company, nor with the drawing up of the prospectus of January, 1904. He had nothing to do with the underwriting. He never authorised Bowden to show the prospectus to anyone, nor to fill in the names of directors upon it. The only prospectus he ever signed or authorised was the one dated April 15th, 1904. He believed the statements in the prospectus were quite true, and he never authorised the issue knowing statements in it were false. He was not interested in the promotion money of the syndicate, and never got one penny out of the flotation. Witness was in Ireland when the allotment was made on April 29th, and had no idea it was being made.

The hearing was resumed on Wednesday, when it was stated that Lord Mayo had been taken ill in the night and was now in the doctors' hands. After an adjournment for consultation with the doctors, the case was adjourned till Thursday.

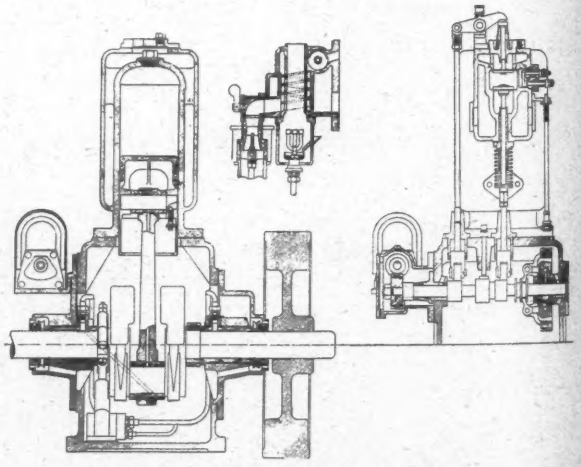
(To be continued.)

Naylor *v.* St. Helens and District Tramways Co., Ltd.

At the Liverpool County Court on Monday, William Naylor, Molyneux Street, Wigan, secured £51 damages and costs against defendant company. On November 23rd he was boarding one of the defendants' cars at St. Helens, and he was thrown off as he had not time to properly secure himself. He sustained injury to the right hand, which set up blood poisoning and incapacitated him from work. The defence was that he wrongfully attempted to board the car while it was in motion.

ALLEN OIL ENGINES.

We recently paid a visit to Messrs. W. H. Allen, Son & Co.'s engineering works at Bedford, to inspect a new line of oil engines which has been developed by the firm. Several examples were running, coupled to centrifugal pumps, dynamos, &c.; we illustrate herewith a direct-coupled engine and dynamo of 1¼ kw. output, suitable for a small country house installation, with sectional drawings of the engine. The latter is specially intended for use



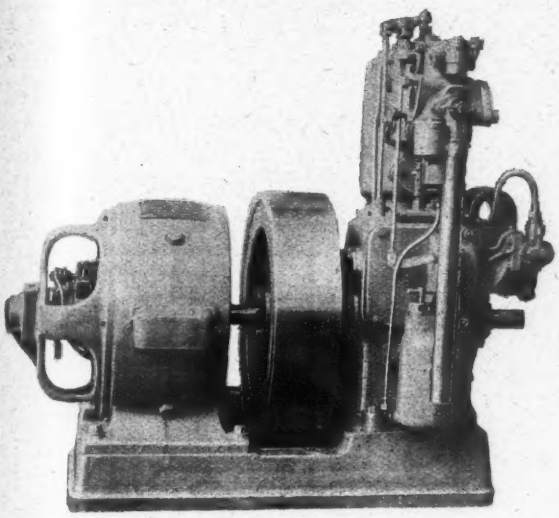
Sections of Allen Oil Engine and Vaporiser.

with paraffin, no petrol being required even when starting up; the vaporiser, which is shown in section herewith, is fitted with a blow lamp using paraffin when starting, the necessary temperature being afterwards maintained by the heat of the exhaust gases.

There are no unusual features in the general design of the engine. The bed-plate and trunk are cast in one piece, to which the bearings are bolted. In small engines the cylinder and combustion chamber are cast in one piece, thus avoiding possible trouble with joints; in the larger sizes the combustion chambers are bolted to the cylinders. The pistons are made exceptionally long for vertical engines, to increase their life as well as that of the cylinders. The cranks are of nickel steel, all other working parts being of Siemens-Martin steel, case-hardened where any wear might possibly occur. The firm's valveless pump is employed to force oil through all the bearings, including the crank-pin and crosshead pin.

The fuel is fed to the vaporiser from a float chamber, passing through the annular space between the lamp tube and the inner wall of the vaporiser. The governor operates a drum throttle, con-

trolling the quantity of mixture, and an automatic valve supplies extra air required at full load. Ignition is by low-tension magneto; the sparking plug is placed at the side of the valve pocket, and is worked by a very simple make and break gear, a feature of which is the simple method of removing the trip rod when it is desired to examine the sparking plug. The magneto is driven from the cam shaft through spiral gear, except in the case of the 2½ B.H.P. engine, where it is oscillated by a crank.



Allen Oil-Engine Dynamo.

A single hand lever operates the half compression and retards the ignition for starting up.

The engine illustrated runs at 800 R.P.M. Other sizes are made, ranging from 1½ KW. to 50 KW., at speeds from 500 to 800 R.P.M. Above 16 KW. the engines are made with two or three cylinders. Needless to say, the workmanship is admirable, and the engines run very quietly indeed.

We were pleased to see, during a tour round the works, that Messrs. Allen had plenty of work in hand, and we understand that they are about to carry out extensions of their workshops.

BUSINESS NOTES.

Consular Notes.—Spain.—The Austro-Hungarian Consul at Madrid reports that official tests were recently made there on electric cables produced at Villanueva y Geltru. These cables are 12,000 metres long and withstood a pressure of 50,000 volts. The tests on these cables, which are the first ever produced in Spain, are said to have shown very satisfactory results.

The Austrian Consul at Barcelona reports that the Sociedad Saltos del Segre has recently been formed to utilise the water-power of certain waterfalls for the production of electric energy. In Valmaseda a new company called the Sociedad Electra Encartada has been formed for the production of electric power for lighting and power purposes. The works of the company for the utilisation of the Incar Falls are making rapid progress, and it is proposed when these works are completed to supply electric energy to Madrid, Valencia, Cartagena and Alicante. On the distance between Madrid and the Incar the iron transmission posts have already been erected, and preparations are being made in Madrid for the erection of a reserve station. The 66,000-volt pressure originally proposed is to be increased to 69,000 volts.

Argentina.—The Compania Alemania Transatlantica de Electricidad have prepared plans for the extension of their electrical installations in Buenos Ayres. A new sub-station is to be built in the Calle Azopardo, between Humberto I. and San Juan, and the existing works in Calle Vidal (Belgrano) and Calle Herrera (Barracas) are to be extended. The total estimated costs of these works will be £32,600.

Roumania.—The German Consul at Bucharest, in a recent report, states that benzine motors up to 40 H.P. are being more extensively used for small industries in the towns, for maize mills, where the locomobile is gradually being ousted, and in the petroleum industry. The steam engine has been practically supplanted, as the fuel for the benzine motors may be obtained almost without cost on the spot. Supplies are mostly from Germany, the German machines being well constructed, well finished, safe in working and easy to manipulate. Motors of English origin secure some trade owing to their cheapness and liberal terms of payment. Producer gas plants are not so popular as they previously were, as supplies of Roumanian anthracite of the necessary purity are more and more difficult to obtain, and anthracite of foreign origin renders the cost of working too expensive. Diesel engines of 100 H.P. and upwards find a good market in the electrical works and waterworks. So long as chemical research does not find a profitable use for the blue oil with which these engines are worked, they will remain the cheapest form of prime mover, at any rate so far as the cost of fuel is concerned. The imports of steam engines have greatly decreased. Supplies are chiefly from Austria-Hungary, partly owing to the fact that the industries which use these engines, viz, the timber industry, the sugar industry, the cellulose industry, the milling industry, and the hemp and flax spinning mills, are mostly financed by Austro-Hungarian capitalists. The imports of electrical utensils and electrical plant are becoming more important from year to year, and the trade is now no longer dependent on the result of the crops, the extension of industrial enterprise in Roumania having created a valuable market for goods of this description. The most important industries from the electrical point of view are the petroleum and timber industries.

Book Notices.—*John Bull's Open Door: A plea for it to be shut.* By A.L.B.M. (A London Business Man). London: The Bartletts Publishing Co. 1s. net.—This is a book on Tariff Reform, lightly written, printed in big bold type, for the benefit, we suppose, of those whose sight is dim, according to the author's point of view. It is accompanied by a couple of dozen, more or less appropriate illustrations and cartoons, and it does not take long to read. We are informed that it is not issued as a profit-making venture—purely for the good of the cause.

"Science Abstracts," Sections A. and B. February, 1909; Vol. 12, part II. London: E. & F. N. Spon. Price 1s. 6d. each part.

"Journal" of the Institution of Electrical Engineers. Vol. 42, No. 193. London: E. & F. N. Spon. Price 5s.—This part contains, amongst other items, papers on "Domestic Electricity Supply," by Mr. W. R. Cooper; "Railway Signalling," by Capt. A. Gardiner; "The Selection of Turbo-Alternators," by Dr. M. Kloss; and "The Testing of Alternators," by Mr. S. P. Smith, with the discussions thereon. The inaugural addresses of the President and the respective chairmen are also given.

The Telegraphists' Guide. By J. Bell & S. Wilson. Sixth edition. London: S. Rentell & Co., Ltd. 1909. Price 2s. net.—As a good tree is known by its fruits, so a good book may be recognised by its new editions; and the attainment of its sixth edition, therefore, in itself renders laudatory comment on this volume superfluous. Its contents have again been thoroughly revised and extended in detail, much of the new matter being based upon official circulars of the Post Office; an appendix has been added describing central battery duplex working, the Vyle polarised sounder, the intercommunication switchboard at the Central Telegraph Office, &c. To students the book is indispensable.

"The Companies' (Consolidation) Act, 1908." By F. Evans and H. H. King. London: Butterworth & Co. 1909.

"Proceedings of the Engineering Association of New South Wales." Vol. XXIII. Sydney: The Association.

"Prospectus of the Working Men's College, Melbourne." 1909. Melbourne: The College. 1909.

"Transactions" of the Glasgow Technical College Scientific Society. Vol. V. part 4.—"Water Resistances," by N. Young; and "The Testing of Petrol Engines," by J. L. Miller. Glasgow The Technical College. Price 2s.

"Construction des Induits à Courant Continu." By E. J. Brunswick & M. Aliamet. Paris: Gauthier-Villars. 1909. Price 2 fr. 50.

"The Municipal Year-Book, 1909." London: E. Lloyd, Ltd. Price 7s. 6d. net.

"The Theory and Practice of Electric Wiring." By W. S. Ibbetson. London: E. & F. N. Spon, Ltd. 1909. Price 5s. net.

Bankruptcy Proceedings.—Maidstone Palace of Varieties.—The question of a contract for electrically lighting the Maidstone Palace of Varieties was the chief feature in connection with winding up proceedings of the company, before the Official Receiver at 33, Carey Street on Tuesday. The liabilities were £4,700, and of this amount £3,500 alone was due for the electric lighting plant supplied to the company, the Official receiver pointing out that this sum was more than the cost of the erection of the building itself. He said that it seemed to him that this amount was tremendous, and he invited an opinion from any creditors present who were practical men. A creditor said the electric lighting of the London Coliseum did not run into more than this amount. Mr. Sylvester, the managing director of the company, said the electric plant was installed by the Building and Furnishing Co., of Norris Street, Haymarket, these being the only people who would put the light in without money being paid down. He estimated that it would cost £7 or £8 per week for electric lighting for the theatre. Mr. Edwards said a creditor said, as a matter of fact, the lighting per week for the six months he was cognisant of the affairs of the company was £6 per week, and sometimes as low as £4 10s. Mr. Douglas Scott, on behalf of the Building and Furnishing Co., said the agreement with the Palace of Varities was to supply plant for lighting for five years at £690 per annum, and at the termination of that period the plant would be offered to the customer at a nominal price. The contract was similar to one now in working between themselves and the Holborn Empire, London. Mr. Edwards said this "preposterous contract" was the cause of the whole trouble, and he alleged that the contract for electric lighting never came before the directors as a body. The Official Receiver, referring to the minutes of the meeting at which the contract was

signed, said there were only three directors present, but the minutes of this meeting were confirmed at a subsequent meeting. In reply to him, Mr. Sylvester said that by agreement the directors met on Thursdays, but there was no agenda sent to them before as to what was to take place at the meetings. The Official Receiver said he imagined that the question might have to be decided as to whether this was a reasonable contract or not, and if unreasonable it would have to be set aside. It appeared that there was not a quorum of creditors present, and, therefore, the matter was adjourned for a week, and if a quorum is not present on that occasion it will be left in the hands of the Official Receiver. At a subsequent meeting of contributories there was again not a quorum present, and the matter was left with the Official Receiver.

Thomas Ward, managing director, Electrical Instruments Manufacturers, Ltd., Freezywater, Waltham Cross.—This public examination was fixed to take place at the Edmonton County Court, on Friday. The Official Receiver (Mr. Cecil Mercer) reminded the judge that the examination should have been held on February 6th, but Mr. Ward then sent a medical certificate, which stated that he was suffering with his heart, and could not undergo examination. Thereupon an adjournment was granted. A few days ago Mr. Ward filed an affidavit by the same doctor, to say that he was suffering from nervous prostration, and could not attend. He (the Official Receiver) was not satisfied with that, and so he made an appointment for his doctor to see Mr. Ward. But when his doctor went, he found that Mr. Ward had gone to Hastings. Mr. Mercer considered that the circumstances of the case were most unsatisfactory. Mr. Ward's doctor did not state where or when he saw him last. As a matter of fact, he understood that Mr. Ward was able to attend at the doctor's house.—Judge Tindal Atkinson adjourned the case until April 2nd, and directed that Mr. Ward must make an appointment to be examined by the Official Receiver's doctor, failing which the Official Receiver would apply for a warrant for his arrest.

R. Russell (trading as R. Russell & Co.), electrical engineer, The Garage, Felsham Road, and 51, Bangalore Street, Putney, London.—This debtor attended at the Court House, Wandsworth, last week for his adjourned public examination. Mr. J. B. Knight, the Deputy Official Receiver, said that the examination was adjourned to enable the debtor to furnish some accounts. The debtor had done his best to furnish the accounts, but they were not complete, though they could be ready in four days. The Registrar accordingly adjourned the examination, and ordered the debtor to complete the accounts and send them to the Official Receiver in four days.

George Sutcliffe (trading as George Sutcliffe & Co.), electrical engineer, 22, Church Street, Abertillery, Mon.—At the Town Hall, Tredegar, last week, the public examination of this debtor was resumed before Mr. Registrar Davies, who ultimately allowed the debtor to pass.

T. C. Hodgkinson (The Electro-Neurotone), dealer in electro-medical apparatus, Goldhawk Road, Shepherd's Bush.—March 24th is the latest date for the receipt of proofs for intended dividend by Mr. G. W. Chapman, Official Receiver, Bankruptcy Buildings, Carey Street, W.C.

E. P. Oliver, electrical engineer (Newington, Priddle & Co.), Great Sutton Street, Goswell Road, E.C.—In the Bankruptcy Court on March 3rd, the adjudication was annulled in this case, and the receiving order rescinded, it having been proved that all the debts had been paid in full.

Peat as Fuel.—The German-Hanover Peat Moor Utilisation Co. is the title of a new company which has just been formed in Berlin with the co-operation of the Deutsche Bank, the Company for Electrical Enterprises, and of chemical and other undertakings. The share capital amounts to £100,000, and the object is the production of gas from peat and its employment in the driving of gas engines and dynamos, the process of gasifying the peat being based upon patent rights.

Smoke Abatement Exhibition.—At this Exhibition now being held at Sheffield, the Union Electric Co., Ltd., besides having their Excello arc lamps adopted for both the interior and exterior lighting of the building, are exhibiting the following apparatus at stand No. 10:—Arc lamps for every conceivable purpose, including their lamps fitted with deposit free covers; D.C. dynamos and motors; polyphase motors; high and low-tension switchgear and measuring instruments.

Catalogues and Lists.—Messrs. A. Reyrolle & Co. Ltd., Hebburn-on-Tyne.—Pamphlet No. 50 illustrating certain of their wall type switch panels specially designed for three-phase distribution and motor control, for currents up to 400 amperes, and pressures up to 6,000 volts. Prices are stated.

Messrs. Prestwich & Burt, South Lane, Kingston-on-Thames.—List A (12 pages) containing illustrations and particulars and prices of a number of their electrical manufactures, including switch fuses, section or switch pillars, transformer pillars, joint boxes, and house fuse boxes.

Calmon Asbestos and Rubber Works, Ltd., 1, 2 and 3, Trinity Place, Tower Hill, E.C.—Eight-page pamphlet relating to their asbestos roofing slates.

Schiersteiner Metallwerk, Berlin.—Priced circulars, printed in German, of time switches.

Messrs. Hamilton Bros., 19, Waterloo Street, Glasgow.—Catalogue comprising a number of leaflets illustrating the W.H. ironclad electric control gear manufactured by them. We understand that a large number of these starters and controllers are working in the United Kingdom. The principal advantage claimed for their latest types—the C. and D.—lies in the hinged cover. All the W.H. gear is ironclad and totally enclosed at the back.

Habirshaw Wire Co., New York.—Price card of white core National code 600-volt wires.

Messrs. Simplex Conduits, Ltd., London, W.C.—New edition of their 12-page catalogue of electric wires and cables. Particulars as to sections, sizes, carrying capacities, prices, &c., are well arranged in tabular form for Association and Non-Association cable. In regard to the former, the company are now making a speciality of supplying C.M.A. cable with the official label attached, thus enabling contractors who desire to keep their accounts for all wiring material with one firm, to do so.

Messrs. Joseph Adamson & Co., Hyde, Cheshire.—List of sizes, English measures and metric equivalents, of dished and flanged ends for Lancashire boilers.

Mr. O. N. Beck, 11, Queen Victoria Street, E.C.—Twelve-page pamphlet giving illustrated particulars with prices, weights, &c., of the Universal pipe flanging expander, with a list of users and testimonials.

The Lahmeyer Electrical Co., Ltd., 109-111, New Oxford Street, W.C.—36-page catalogue with particulars, illustrations, and tabulated sizes, weights and prices, of Neptune solid and flexible copper rail bonds for railways and tramways.

The Grondal Kjellin Co., Ltd., 20, Abchurch Lane, London, E.C.—Advance copy of a new publication entitled "Electric Furnaces," wherein they give very fully illustrated particulars of the Kjellin, Colby and Röchling-Rodenhauser electric induction furnaces, describing the most recent developments in their electric steel furnaces. The pictures of furnaces are large and interesting, and there are further, outline sections of single and three-phase combination furnaces.

Liquidations.—Santoni Arc Lamp and Engineering Co., Ltd., and Rex Electric and General Supplies, Ltd.—These two companies are winding up voluntarily owing to inability to meet liabilities. Meetings of creditors are to be held at 2 p.m. and 11 p.m. respectively on Tuesday, March 16th, at 8, Mansion House Chambers, 11, Queen Victoria Street, E.C., when Mr. W. McIntosh Whyte, the liquidator, will lay before them statements of affairs.

The Colliery Power Supply Syndicate, Ltd.—A meeting is to be held at 24, Clegg Street, Oldham, on April 14th, to hear an account of the winding up from the liquidator, Mr. W. W. Brierley.

Decline of German Exports.—A perceptible decline in the exports of electrical engineering products from Germany is taking place, the first diminution being of a slight extent in November. The movement became accentuated in December and January, and the total tonnage exported in the latter month was only 3,998 tons, as compared with 5,448 tons in January of last year, being a reduction of 1,450 tons, or 27 per cent. As the German exports in 1908 represented a value of over £9,000,000, or an average of, say, £750,000 per month, the retrogression in January this year, according to the tonnage, corresponds to about £200,000. The details show that the exports of dynamos in January amounted to 1,512 tons, as contrasted with 2,120 tons in the corresponding month in 1908, and Italy occupies the first place in having imported a smaller quantity. Cables also experienced a sharp decline, the figures for January being 1,016 tons, as against 1,759 tons in the corresponding month in 1908. On the other hand, the exports of incandescent lamps increased, the quantity having advanced from 90·9 tons in January, 1908, to 102·3 tons in the same month of the present year.

Country House Lighting.—The Walsall Electrical Co., Ltd., who have long made a speciality of country house lighting, a department of work in which they are very busy at present, have sent us one of their finely-illustrated pamphlets on the subject. They have recently become agents for the Aster Engineering Co.'s engines, and these they are adopting with their plant for country house electric lighting sets.

Insurance against Unemployment.—We have received from the Car and General Insurance Corporation, Ltd., of 1, Queen Victoria Street, E.C., particulars of their scheme for insurance against unemployment, or loss of employment from a number of specified causes. Mr. E. Manville is chairman of the company, Mr. J. M. Gorham, M.I.E.E., is a director; so also is Mr. Frederick Kerr, the managing director of the Anglo-Portuguese Telephone Co., Ltd. The scheme is quite new, and it may interest some men at present employed in connection with the electrical industry of this country to know of its existence.

Electrical Irrigation in Spain.—Electrical energy might be used with advantage for irrigation purposes in many parts of Spain. The vast plains in the Provinces of Valencia, Mincia, Catalogna and Andalusia have all been made fertile by the irrigation works which date back to the time of the Moors; other regions, however, although equally well situated, are incalculably behind-hand, because nothing has been done to adopt the same means of rendering the lands fertile. This might be done by profitably using some of the numerous waterfalls that are to be found in the peninsula, few of which to-day are used electrically. There is not much scope for industrial work in Spain, but there is a great deal of room for anything that will assist the agricultural undertakings.

Trade Announcements.—We are informed that Messrs. Willans & Robinson, Victoria Works, Rugby, will shortly be manufacturing water turbines to drawings prepared by Mr. Jens Orten-Böving, of Victoria Street, S.W., who has secured the assistance of Mr. R. Weber, who was for 17 years in the works of Messrs. Escher, Wyss & Co., of Zurich, Switzerland, to whom he

was chief constructing engineer for over seven years, being responsible, we understand, for the great high-pressure power plants which they have supplied in all parts of the world—such as the plants of the Mexican Light and Power Co., Rio de Janeiro Light and Power Co., &c. Messrs. Willans & Robinson will at first manufacture high-pressure turbines, and will afterwards proceed with the Francis turbines. In the manufacture of the latter Messrs. Willans & Robinson will be largely assisted by Messrs. Verkstaden, of Kristinehamn, Sweden, whose works will be shortly passing under Mr. Orten-Böving's control, and whose experience will be placed at the disposal of the Rugby firm.

Messrs. Pope's Electric Lamp Co., Ltd., of Willesden, announce that their agency arrangement with Messrs. Loxley & Co., of Leeds, terminated on February 17th.

We are informed that, with the object of further extending the manufacture of their goods in the United Kingdom, the business of the Sterling Telephone and Electric Co. has been converted into a private limited liability company. With the additional facilities afforded by English works, it is anticipated that within a reasonable time all telephones, bells, &c., sold by them will be made in England throughout. The management remains as heretofore with Mr. Guy Burney, who has been appointed managing director of the company.

Messrs. J. Baggerley & Son have taken over the business of Messrs. Baggerley & Wood, electrical engineers, 23, High Street, Newcastle-under-Lyme.

We are asked to state that the Electric Lamp Buyers' Association has commenced business at 11, Queen Victoria Street, E.C. Catalogues and discounts from lamp-makers are invited.

Metallic-Filament Lamp Voltage.—It is well known that the voltage of supply circuits is often in excess of that declared; it has been suggested to us that this probably has a great deal to do with the dissatisfaction that is sometimes expressed in regard to the behaviour of metallic-filament lamps. Over-running, it is well known, damages the filaments, and this applies not only to lamps installed on the actual supply voltage, but also to those fixed on transformer circuits. It is advisable, therefore, to make a practice of ordering lamps for a higher voltage by, say, 5 per cent., than that declared; the reduction of efficiency is small, and the practice results in a much longer life for the lamp, and a general increase in the satisfaction of the users.

Universal Arc Lamp.—The Regina Bogenlampenfabrik, of Köln-Sülz, inform us that they are introducing an entirely new arc lamp, called the "Conta" arc lamp, which has no regulating mechanism. Round carbons are used, held vertically and fed automatically by their own consumption. The arc cannot ascend or burn obliquely, and the efficiency is said to be extraordinarily high—1,600 Hefner c.p. with 275 watts, and about ·12 watt per candle in a 660-watt lamp. The lamp is suitable for d.c. or a.c., parallel or series burning, and for pure or flame carbons.

Electro-Plating and Storage Batteries.—It has been realised in the electro-plating industry, that the quality of the work is largely dependent upon the steadiness of the electric current, the slightest variation affecting the density and evenness of the deposit. The D.P. Battery Co., of Bakewell, has recently laid down a battery of an unusually large size of cell for a Midland firm, the use of which has effected so marked an improvement in their manufacture, that there seems reason to suppose that the use of accumulators, instead of plating direct from the dynamo, will ultimately become the universal practice.

Canada.—A special commissioner of our contemporary *Canada*, writes as follows, on the electrical trade position:—"So far as electrical apparatus and instruments are concerned, the output from the Canadian factories is very considerable and is growing substantially. In their adaptability to being able to make such goods successfully, the United States have the largest share of the import trade. The market for England in finished goods is not a very hopeful one, but a substantial trade can be looked for in various electrical accessories, cables, insulators, and a variety of similar lines. The main demand for electrical goods is, of course, in traction (street-cars, &c.), motive power for plants, &c., telephones, and lighting. In every one of these there is enormous development going on, and inasmuch as there is comparatively little variation in electrical appliances and accessories in use in Canada from similar items in England, the British maker should find a wider trade with ordinary attention to the market. As soon as a maker finds a secure demand he would be well advised in holding stocks in Canada forthwith. If business comes his way it is likely to be 'rush' business, and in that case expeditious delivery is everything. Remember, expeditious delivery means eliminating the Atlantic voyage, because your American and Canadian competitor is on the spot."

Lantern Slides.—With reference to a note that appeared in this column last week, we learn that The Union Electric Co., Ltd., of Park Street, Southwark, S.E., have for some seasons past made a practice of lending lantern slides of their apparatus for lecture purposes. We have received a list of these slides, which are interesting and varied, relating to lighting and power work, and our readers are asked to take note that the company will be pleased to hear from station engineers and others who desire to make use of them.

For Sale.—The Darlington Corporation is inviting offers for the purchase of two 35-kw. steam dynamos, which can be used either as generating sets or steam balancers. The sets are to give way to larger plant. Some particulars appear among our advertisements to-day.

Aluminium Solder.—After experimenting for several years, Mr. W. G. Jeffery, of 8a, Viewland Terrace, Eastcombe Avenue, Charlton, has succeeded in devising a satisfactory solder for aluminium, and has shown us a number of sample joints made with this solder between aluminium and aluminium, brass and copper, which appear to be perfectly sound and very strong. Mr. Jeffery has also invented a flux which enables aluminium to be soldered with ordinary tin-lead solder, and we have examined samples of these joints. The inventor is desirous of placing a new solder and flux on the market, and will answer inquiries addressed to him on the subject.

LIGHTING and POWER NOTES.

Accrington.—The town clerk wrote to the Clayton Council last week relative to the proposed electricity provisional order. He enclosed a resolution from his Council to the effect that it was very doubtful whether the demand for energy in Clayton-le-Moors would pay for the cost of supplying same, and that as it was offered to be supplied at the same rates as charged in Accrington, near the place of generation, consumers within the district would benefit considerably.

Acton.—The U.D.C. has had under consideration terms submitted by the Metropolitan Electric Supply Co. as to taking over the Council's electricity undertaking. The terms include a new contract covering a period of 37 years; the company to provide additional capital on terms; to pay off financial charges, &c.; and the Council to take not less than 180,000 units per annum, at 1d. per unit, for street lighting. The terms would be subject to the Board of Trade's approval. The Council discussed the proposals at length, and ultimately passed a resolution expressing willingness to accept the offer providing conditions regulating the charges were introduced, with a further motion inviting the company to state what it would give for the purchase of the undertaking outright.

Amersham.—The R.D.C. has consented to the application of the Chesham E.L. and Power Co. for a prov. order for E.L. for the parishes of Amersham, Ashley Green, Chesham Bois and Latimer, on condition that if overhead wires are used there will be a wire cradle under them.

Belfast.—A preliminary proposal to form the basis of the agreement for the supply of electricity to the Harbour Commissioners for power and lighting purposes, has been referred to the engineer and consulting electrical engineer for a full report, including the cost of adapting the proposals to the Commissioners' requirements.

Birmingham.—Recently, when the report of the Electric Supply Committee, containing recommendations to obtain further loans of £149,350, was presented to the City Council, Alderman Sir Hallewell Rogers, in the course of a speech, indicated the position which exists in many towns owning both electricity and gas undertakings. He said:—"He should be the last to oppose the resolution, as the money was wanted for an extension of the work; but the Council ought to know how the matter stood. It seemed the department was going ahead by leaps and bounds, and their expenditure was very large and very heavy. There were two departments in the Council which helped the lighting and power of the city, and if one increased unduly quickly, it must be to a large extent at the expense of the other. That being so, the Council must understand that the gas department would suffer to some extent. He did not say that it was not right it should suffer. He thought consumers should have the option of taking gas or electricity, if they did not require both, but he wanted the Council to know that in the opinion of the gas department the electric light department were going rather quickly. He hoped they would not press their wares, because they should remember that the gas department had for many years contributed large sums to the city." In view of this speech, it may be interesting to record that the gas department has well over 100,000 consumers and the electricity department possibly 4,000.

Blaydon-on-Tyne.—The U.D.C. has decided to oppose the Bill of the County of Durham Electrical Power Supply Co.

Bolton.—A L.G.B. inquiry was held on March 3rd into the application of the T.C. for a loan of £25,000 for electrical purposes. There was no opposition.

Braunton (Devon).—There is a proposal to introduce electric lighting into this village, in North Devon, and a movement is on foot to form a company for the purpose. The idea is to enter into an arrangement with the L. and S.W. Railway Co, by which the company would grant the use of the Braunton pumping tower free of rent and further pay £52 per annum for keeping the tank pumped full of water. It is intended to use a suction gas or oil engine; the cost for street lighting would be the same as at present paid for oil lighting—£52 a year. For private lighting, on the contract basis, the cost to the consumer would be 8s. per annum per 32-c.p. metallic-filament lamp. It was considered that the cost of a plant for electric lighting would be £3,000, as against £6,000 for adequate gas lighting plant.

Bury (Lancs.).—The B. of T. has intimated to the R.D.C. that it has withdrawn the objections to the transfer of the electric lighting of the Council's area to the Lancashire Electric Power Co.

Carlisle.—The T.C. has received sanction to a loan of £1,000 for a coal elevator, &c., at the electricity works.

Colchester.—The T.C. has decided to supply electricity to the Hythe district by means of the existing overhead tramway wires, at a cost of £485.

Continental Notes.—ITALY.—The authorities of the Province of Alessandrio have granted a concession to the Società Industrie Electricca di Val d'Orba, to put down a plant for the electric lighting of the town of Rocca Grimalda.

The Commune of Poschiavo has granted a 50-year concession to the Brusio Electric Works for the utilisation of the water power of the River Cavagliasco. The power station will be situated at St. Carlo.

FRANCE.—M. Pataud, the energetic secretary of the Electricians' Trade Union, has recently been on the warpath again. When previous strikes have been ordered, the Paris Hotel Continental, having a private plant, has always escaped. The other evening, just as preparations were being made in the hotel for a banquet and guests were arriving for two balls, the redoubtable Pataud gave orders for a cessation of work by the electricians, and subsequently compelled the luckless hotel manager to sign an agreement raising the electricians' wages by 10d. a day.

AUSTRIA-HUNGARY.—The Municipal Council of Tarnow has decided to expedite the installation of a large central electrical generating station. A large tract of land has already been purchased for that purpose.

NORWAY.—Works for the manufacture of steel by the electric process have been established near Flekkefjord, the driving power being supplied by the neighbouring falls. The process adopted is one patented by the Norwegian engineer, Hjorth. Tool steel is now turned out, but it is intended eventually to increase the plant so as to produce steel plates, &c. The raw material, iron ore and bar iron, are obtained from Sweden.

Darlington.—The T.C. has decided to apply for a loan of £3,900 for additional generating plant.

Fareham.—The U.D.C. has decided to terminate the agreement with the Southern Electric Free Wiring Co., as it has proved irksome, and is alleged to be causing people to give up the electric light.

Fermoy.—A public meeting was held here on the evening of the 6th inst. for the purpose of taking into consideration the advisability of forming a company for the electric lighting of the town. Mr. F. C. Porte, of Cork, submitted a scheme, to cost from £5,000 to £6,000. As a result of the meeting, 2,000 £1 shares were taken up, and a detailed statement of the scheme is to be placed before another meeting, which will be held in a fortnight or so.

Hastings.—The efforts of the electric light department have received a set back at the hands of the L.G.B. Recently a public inquiry was held by the Board into an application of the Corporation to borrow the sum necessary for the conversion of some 700 or 800 street gas lamps into electric lighting standards. It was shown that this policy would considerably help the finances of the undertaking, but at the inquiry the application was strongly opposed by Mr. Horace Avory for the gas company. A few days ago, at a meeting of gas shareholders, Dr. Gray, J.P., was able to announce that the application of the Corporation had been refused. The gas company at present contract with the Corporation for the great bulk of the street lighting. Whilst the decision of the L.G.B. has caused elation amongst the owners of local gas stock, it cannot but be regarded as bad news for the ratepayers, who this year are faced by a deficit of £4,000 on the electric light undertaking. In view of the state of affairs, the Corporation is considering the advisability of raising the charge for energy, and the St. Leonards Ratepayers' Association suggests that the Corporation be respectfully asked to consider the advisability of taking steps to dispose of the undertaking.

Hessle.—With reference to the projected electricity supply for the town, the Hull T.C. has advised the U.D.C. that it could only give a supply in bulk, and such a scheme would be most difficult to work. It would be better if the U.D.C.'s order was taken over entirely by Hull, but to do this, Hull would have to obtain a prov. order. It was considered that, by wise and careful development, the scheme could be made into a fairly successful and remunerative undertaking.

London.—L.C.C.—The Finance Committee of the Council recommends that sanction should be given to the borrowing by the St. Pancras B.C. of £12,077 for electric lighting purposes, including £2,645 for a Druitt Halpin thermal storage system and £9,657 for turbo-generating plant.

The Committee has further considered the application of the St. Marylebone B.C. for sanction to a loan of £8,000 for electric street lighting, and has decided not to recommend this expenditure. Judging from the Committee's statement, the principal grounds for refusal are that the estimated profit per unit for street lighting to the B.C., 9d. per unit, is much less than would be obtained from ordinary consumers; that the B.C. has already invested two millions in its undertaking, and that this amount should not be increased except for absolutely necessary works. The Committee considers that the present gas lighting is quite satisfactory—apparently accepting the evidence of the Gas Light and Coke Co. that the lights *should have been maintained at* 70 c.p. The gas company says that the standard illumination maintained would be 50 per cent. better if the company undertook the work; and it appears to us that the B.C. cannot do better than accept the company's proposal to do this work, *but with substantial penalties for every gas lamp found to be under the stipulated candle-power*. It appears from tests that the so-called 70-c.p. gas burners gave an average of 50 c.p. and it is a matter for regret that general financial considerations should have interfered with the proposed use of lamps which actually give their rated and paid-for illumination.

The City Corporation is about to send a deputation of the Streets Committee to visit several Continental centres, including Paris, Berlin, Vienna, Brussels, Hamburg, &c., to report on the various systems of gas and electric lighting there, with a view to comparing them with the systems in use in the City.

HAMMERSMITH.—The district auditor has intimated that he will require the inclusion in the 1907-8 accounts, of the proportion of all charges for principal and interest accruing due to the end of the year, but not becoming payable till after the close of the year. This will, in effect, charge these accounts with an additional sum of £5,651, which will seriously effect the reserve fund.

HACKNEY.—The Electric Lighting Committee recommends that a protest should be made to the L.C.C. against its policy of encroaching on the jurisdiction of B.C.'s in obtaining clauses in recent electrical Bills substituting itself as purchasing authority in place of the Borough Councils, and in regard to other matters.

POPLAR.—A committee which has visited Greenock reports that the average number of units of electricity generated per ton by the refuse destroyer there was 67. Compared with what is expected at Poplar, this average is unfavourable, but the borough surveyor states that many things combine to make it reasonable to expect that better results will be obtained at Poplar with the destructor now in course of erection.

Lytham.—The lighting of this Lancashire seaside resort by electricity is about to be carried out by a private company. This development has been on the tapis for sometime past.

Merthyr Tydfil.—The Electric Traction Co. has submitted to the T.C. terms for lighting the lower portion of the borough with 340 pairs of lamps, each pair of 50 c.p., at a cost of £1,650 per annum. The offer is being considered by the Lighting Committee.

Newcastle Emlyn.—The Carmarthenshire C.C. has referred to the chairman, clerk and surveyor, with powers to settle, the dispute between the U.D.C. and the C.C. respecting the carrying out of the electric lighting scheme.

Radcliffe.—In its letter to the Council, sanctioning, subject to certain conditions, the borrowing of money for the extension of the electricity undertaking, the L.G.B. says that, "looking to the probable growth of the Lancashire Power Co., whose central power station is in the district, the Board thinks that the Council should fully consider the question of its future procedure in relation to this."

Southgate.—The North Metropolitan Electric Power Supply Co. has altered the suggested terms of repurchase from 21 or 28 years to 14, 21 or 28 years; also the purchase price to one-fourth instead of one-third addition to the capital expenditure. The Council has accepted these terms.

Southwick.—Brighton T.C. has expressed a desire to reopen negotiations for the supply of electricity in the district, and the matter is being considered by the Joint Committee of the Southwick, Shoreham, and Portslade Councils.

Swansea.—The T.C. has appointed a Committee to consider the advisability of having the schools in the town which are close to mains, lighted by electricity.

Walmer (Kent).—At a meeting of the U.D.C. on March 5th, the clerk, reporting on the provisional order, said he was afraid they would not be able to keep the matter open any longer. If a company had had the order, it would have been revoked at an earlier stage. It had been suggested that a scheme might be brought out in co-operation with Deal. The Council decided to ask the B. of T. to let the matter be deferred for another month.

Walsall.—The Corporation's electrical engineer, Mr. Barnard, has reported to the Electricity Committee on the necessity of immediate extensions to the plant. He suggests that these extensions should be on comprehensive lines, and that certain outlying districts, at present unsupplied, should be connected up. The scheme, which was adopted by the T.C. later, will involve an expenditure of £30,000 to £35,000. Application is to be made to the L.G.B. for sanction to a loan of the amount required.

Wells.—The T.C. has decided to take no action with regard to the Somerset and District Electric Power Bill.

West Bromwich.—The T.C. has received sanction to a loan of £3,000 for electricity purposes.

West Ham.—It may be remembered that, some months ago, a L.G.B. inquiry in regard to an application by the T.C. for sanction to borrow money for the electricity undertaking, was adjourned *sine die* by the inspector upon the representatives of the Council refusing to make public the prices at which they supplied certain power consumers. In a report upon this matter circulated on Monday, the Electric Lighting Committee states that the town clerk has received a letter from the L.G.B., asking that in the first instance the contracts in question be forwarded to it with any observations which the Council may wish to offer in regard to particular cases. The question of the necessity or otherwise of

making public the contracts at the resumed inquiry would then be further considered in connection with the facts disclosed by the contracts, but in any case no direction will be given by the Board in the matter until it has communicated further with the Council and considered any representations it may desire to submit. The town clerk, in accordance with this, has forwarded the whole of the contracts for power supply to the Board, and he informed the Committee that the offer to do this had been made on behalf of the Council when the public production at the inquiry had been declined. The Finance Committee is to be asked to consider the question of applying for sanction to borrow £15,000 for transformers and £8,000 for motors to hire to consumers, this to cover the estimated expenditure under these headings for the next three years.

Whitwood.—Negotiations are in progress between the U.D.C. and Yorkshire Electric Power Co. as to terms for a supply by the latter of energy in bulk to the boundary of the Council's area; the matter is being considered by a committee.

Wolverhampton.—At the meeting of the Town Council on Monday, Councillor Gough Allen (chairman of the Electricity Committee) submitted a resolution to the effect that the sum of £1,417 be transferred from the profits of the electricity undertaking for the year ending March 31st, 1909, to the credit of the Improvement Fund, for the financial year ending March 31st, 1910. Councillor Allen added that he thought it was a matter of congratulation that, in a year of bad trade, Mr. Shawfield had been able to make a contribution to the rates. The motion was carried.

Yarmouth.—An inquiry was held on Thursday, last week, by the L.G.B. into an application by the T.C. for power to raise a loan of £2,500 for electric lighting. The electrical engineer, Mr. Gordon Bryant, explained that the loan was for new mains, required in consequence of the conversion of street lighting from gas to electricity; Sugg lanterns were being used, each containing two Osram lamps.

TRAMWAY and RAILWAY NOTES.

Bournemouth.—At a meeting of the T.C. held on March 2nd, the chairman of the Finance Committee, speaking on the tramway revenue during the past year, said the expenditure had been £89,953, and the revenue £84,250, showing a deficit on the year. These figures, he thought, were mainly due to the fact that the reduction of fares came into force at the commencement of the financial year, and that they carried over 200,000 passengers less than in the previous year. The Committee had appointed a sub-committee to go closely into the question of fares, distances, &c., so that the revenue might be brought up to meet the expenditure.

Cardiff.—The T.C. estimates that it will spend £119,000 on the tramways next year, a sum £4,000 in excess of this year's expenditure. The increase is due to the setting aside of £11,000 for the repair and reconstruction of the track, as against an annual expenditure of £7,000. Next year's income is estimated at £113,000 as compared with £110,000. The T.C. proposes to set aside £14,522 for depreciation, and it has to make good a deficiency of £1,905 during the year ended March, 1908, but as a set off against this there was an estimated profit of £9,641 last year leaving £6,786 to be secured for the rates. The Tramways Committee has recommended the Council to levy a 1½d. rate to meet the requirements.

The Council has appointed a committee to consider the question of increasing the tramway fares. Mr. Arthur Ellis, the manager, estimates that by a small increase the revenue will be raised by £10,000 a year. Since the introduction of the transfer system 12 months ago, this innovation has brought in £6,000.

The Council has decided to call in an independent expert to report upon the condition of the tramway tracks.

Cheshire.—Despite the talk in certain quarters of opposition to the scheme, the important electrical enterprise in the Wirral peninsular, which is becoming a vast residential adjunct to Liverpool, is to go forward, and it is now possible to give a better idea of the scope of the proposals which are put forward to increase the travelling facilities in this district, which embraces the outlying portions of Birkenhead and New Brighton, and for making possible a quick service of trains to Liverpool, *vid* the Mersey Electric Railway tunnel. The promoters are really seeking to link up the existing lines by a new electrically-equipped railway, granting running powers over the new system, and if required, electrifying the whole upon mutually advantageous terms. From plans prepared by Mr. Jos. Pearce and Mr. C. Gordon Lloyd, architects and surveyors, of Liverpool, it is seen that the intention is to connect the existing station of the Wirral Railway Co. at New Brighton with a new line, bringing the passengers down to the Promenade, midway between New Brighton Pier and Egremont Ferry, and from thence (through the towns of Liscard and Wallasey) to the Wirral Co.'s lines near the new Golf House, by means of a circuitous route, with stations at short intervals. Another section will connect Birkenhead Park Station with Claughton and Flaybrick Hill, and from thence through Higher Bidston to Upton Station, on the Great Central line, through a rapidly rising district, ripe for development. Later, it is proposed that the new Upton Junction, which is situate about the centre of the Peninsular, will be a starting point for a further line through Greasby, Frankby and Caldy, the intention being to form a junction with the London and North-Western and Great Western line at this point before crossing the Dee into Wales.

Continental Notes.—GERMANY.—An electrical motor vehicle for the rapid transport of firemen is to be added to the equipment of the fire brigade of Nuremberg, Germany.

AUSTRIA-HUNGARY.—An application has been made to the Minister of Public Works for a concession for the construction and working of an ordinary gauge electric railway from Tirano to Bormio. The line will be nearly 25 miles long.—*Board of Trade Journal.*

Dartford.—Provided that the Council retains all its rights against J. G. White & Co., Ltd., the U.D.C. has decided to consent to that firm assigning the lease of the tramways to Balfour, Beatty & Co., Ltd., which has a subscribed capital of £50,000.

Dublin.—Some 18 summonses have recently been issued by the Corporation against the Tramway Co. in respect of the condition of the tramway track. The Tramway Co. has, however, obtained a conditional order of prohibition, preventing the local magistrate from proceeding in the matter.

Elland.—The National Electric Construction Co. is about to commence the construction of tramways in the Elland district, the start having been unavoidably delayed.

Hamilton.—Considerable progress has been made with the extension of the Lanarkshire tramways from the Hamilton burgh boundary to Uddingston. The line will go through a populous district, and will link up the Glasgow tramways and an important centre.

London.—During the recent frosty weather, on March 8th, the Wimbledon and Putney Bridge section of the Metropolitan District Electric Railway was "held up" in the early morning owing to the layer of ice which had accumulated on the rails. Curiously enough, none of the other exposed sections of this railway suffered in the same way. If an occurrence of this sort is anticipated, it is usual to clear the rails by periodically running a steam locomotive over them fitted with special steel brushes.

New South Wales.—The revenue of the Government Tramways Department for the quarter ending December 31st last, amounted to £277,013, being an increase of £16,586. Over 47 million passengers were carried, 135 miles of line being worked, mainly by electric traction.

Perth.—Mr. Lambert, tramway manager, has been asked to report as to the extensions of the tramways along King Edward Street to the City Hall, and as to the erection of a car-shed in the new street, south of the City Hall.

Rhyl.—After a heated debate, the Council on Monday, by a majority of one, refused to take a poll of the ratepayers as to the provision of tramways, as suggested by the Light Railway Commissioners at the recent inquiry. Only one member of the Council was absent, and the advocates of the tramways urged that he was in favour. It was contended that the tramways would spoil the sea front, that heavy electricity expenditure would be necessary, and that no guarantee was given by the tramway promoters.

South Shields.—The T.C. has decided not to entertain the proposals of the Tyne Tube syndicate for financial support and guarantee. A similar decision has been arrived at by the Tynemouth Corporation.

Yarmouth.—Recently a car running along the Marine Parade was derailed owing to the accumulation of sand in the grooves of the rails. Luckily the car was brought to a standstill on the pavement, and no particular damage resulted.

TELEGRAPH and TELEPHONE NOTES.

Association of Chambers of Commerce.—At the annual meeting last week, the Telephone Committee reported that nothing further could be done towards the reduction of rates until the Post Office had taken over the whole system. A resolution was passed affirming the desirability of establishing cheap telegraphic communication within the Empire, and suggesting that a conference of postal authorities should be convened with a view to the extension of the policy of State-owned cables.

Canada.—The first telephone statement to appear in any provincial budget is that of Manitoba. The income in this, the first year under Government operation was $656,486.74. During the year there have been 408 miles of long-distance telephones constructed and 583 miles of farmers' telephones. During the fiscal year the number of telephone subscribers increased from 14,000 to 20,000.

Indo-European Telegraph.—Reuter states that the Shah's troops have cut the Indo-European Telegraph Co.'s line between Tabriz and Julfa.

Italy.—On Monday a disastrous fire broke out in Turin, and the Central Telephone Exchange was practically destroyed.

Liverpool.—The new trunk telephone equipment installed at the Liverpool post office has been built by the British Insulated and Helsby Cables, Ltd., from designs drawn by the Post Office engineers, and was erected under the supervision of Mr. W. Slingo, superintending engineer. The special features of the new installation are ingenious mechanical adaptations, tending to the instant placing of a "caller" in communication with the called, and an automatic registering and notification of the time limit, three minutes, for which a single call is effective. An electrically-operated clock registers the time, while a coloured glow lamp lighting up informs the operator that the limit has been reached.

New Cables.—The corrected length of the Mozambique-Beira cable is 988·866 km., and of the T-piece to Quelimane 113·172 km., while the length of the Beira-Lourenço Marques cable is 1,070·498 km.

New Offices.—The Portuguese Colonial Administration has opened to international service a telegraph station at Lunuango in the Congo district. The German Imperial Administration has opened a telegraph office at Sokode in Togoland, as well as at Awasab and South Kalkfontein. The Chinese Administration has opened an office at Hongshan in the province of Kwantung.

Spain.—A commencement has been made at Cadiz with the construction of a wireless telegraph station for the public service.

Telegraphic Interruptions:—

Port Arthur-Chifu	March 9, 1904
Pontianak-Saigon	Sept. 16, 1908
Tourane-Amoy...	Jan. 19, 1909
Oran-Tangier	Feb. 20, 1909
Cayenne-Salinas	Feb. 27, 1909

Wrong Number.—Sheriff Davidson has given judgment in an action against a Glasgow firm for recovery of £5 5s., the rent for one year of a telephone. Defenders lodged a counterclaim for loss through their not having the proper use of the telephone, owing to the wrong number being printed in the directory. The Sheriff concluded that the defenders had full use of the telephone for outward calls only, but the loss of the other portion of their use of the instrument might be very serious. They were entitled to some deduction and also damages, which he decerned at £2 12s. 6d., with full expenses to defenders.

CONTRACTS OPEN and CLOSED.

OPEN.

Algiers.—April 1st. The Prefect of Oran will receive applications for a concession to construct and work electric tramways about 18 miles in length.

Australia.—Melbourne.—April 23rd. A power plant for the Central Telephone Exchange, Melbourne. See "Official Notices" March 5th.

Melbourne.—March 25th. 825 opalescent arc lamp globes. See "Official Notices" to-day.

Brisbane.—March 29th. Supply of iron work, insulators, bronze wire and accessories, iron wire and covered wire. Deputy Postmaster-General, Brisbane. Copies of the tender-forms, &c., may be obtained at the Commonwealth Offices, 72, Victoria Street, London, S.W., where also the necessary deposits on tenders may be paid. Specification may be seen at the office of the Electrical Review.

Sydney.—May 31st. Two 4,700-K.V.A. turbo-alternators, with condensing plant, &c., and one 447-K.V.A. ditto, for the Council's electricity supply department. See "Official Notices" to-day.

Austria.—The Tyrol.—The municipal authorities of Sexton, in the Tyrol, are about to invite tenders for the establishment of a central electric lighting station in the town.

Belfast.—March 15th. Stores for the electricity department. See "Official Notices" February 26th.

Bolton.—March 25th. Materials and stores for the Electricity Committee. See "Official Notices" to-day.

Bridlington.—March 30th. Illuminations for the Royal Prince's Parade. See "Official Notices" to-day.

Brighton.—March 22nd. One 300-KW. three-phase induction motor-generator for Southwick power station for the Corporation. See "Official Notices" to-day.

Burnley.—March 15th. Electrical goods for the B. of G. J. S. Horn, Clerk, Union Offices, Burnley.

Cardiff.—March 26th. Switchboard, pipework, and cables for the Corporation. See "Official Notices" to-day.

Croydon.—March 15th. Electrical fittings and appliances for the B. of G. Union Offices, Mayday Road, Thornton Heath (Surrey).

Darlington.—March 25th. One 500-KW. D.C. dynamo coupled to an exhaust steam turbine for the Corporation. See "Official Notices" to-day.

Edinburgh.—March 29th. Materials for the Electricity Supply Department. See "Official Notices" to-day.

Germany.—Bad Steben (Bavaria). The municipal authorities are about to invite tenders for the establishment of a central electric lighting station in the town.

Govan.—March 30th. Stores for the electricity department. See "Official Notices" to-day.

Halifax.—March 23rd. Electrical fittings for six months for the B. of G. A. T. Longbotham, Clerk, 4, Carlton Street, Halifax.

Lancaster.—March 12th. The County Asylum Visiting Committee is inviting tenders for electrical goods. J. R. Wilson, Clerk, The Asylum, Lancaster.

London.—Hammersmith.—The Electricity and Lighting Committee is asking for authority to purchase on the most favourable terms, as opportunity offers, sundry lots of steam coal, to be stored at the electricity works, up to a maximum of 10,000 tons.

Hackney.—April 22nd and May 6th. Arc lamp carbons for one year; also cables, troughing, &c. In both cases tenders have to be handed personally to the chairman at Council meetings to be held respectively on April 22nd and May 6th. See two "Official Notices" to-day.

L.C.C.—March 24th. Electric lighting, bells and telephones at St. John's Hill Divisional Office, Wandsworth. See "Official Notices" to-day.

Metropolitan Asylums Board.—March 26th. Electric light installation for the N.E. Fever Hospital, for the above Board. See "Official Notices" to-day.

Newport (Mon.).—March 22nd. Various lamps and meters for the Electricity and Tramways Department. See "Official Notices" March 5th.

Partick.—April 3rd. Materials for the T.C. electricity department. See "Official Notices" to-day.

Poland.—Tenders are about to be invited by the municipal authorities of Souvalki for the establishment of a central electric lighting station in the town.

Preston.—March 25th. Electrical sundries for the County Asylum, Whittingham. Thos. Dilworth, Clerk and Steward.

Rochdale.—March 17th. Water treatment plant for the Electricity Committee. See "Official Notices" February 26th.

Rotherham.—March 19th. Electrical installation at the girls' secondary school. Holdgate & Harrison, architects, 9, Gray's Inn Square, W.C.

March 18th.—Six double-deck top-covered electric tramcars for the Corporation Tramways Committee. Tramways Manager, Mr. E. Cross.

Renfrew Landward.—The School Board invites specification and tender from electrical contractors for work at new school at Victoria Drive, Scotstoun. Kerr & Watson, architects, Johnstone.

Salford.—March 29th. Re-wiring at the Royal Technical Institute for the Electricity Committee. See "Official Notices" to-day.

South Africa.—Bloemfontein.—April 16th. Electric light fittings for the new Law Courts of the Government of Orange River Colony. Particulars from Agent-General for the O.R. Colony, 121, Victoria Street, S.W. (£2 deposit).

Spain.—Madrid.—April 7th. The Public Works Department will receive tenders for the construction and exploitation of a tramway from Termens to Lerida. Particulars may be obtained from the Direccion General de Obras Publicas.

April 1st.—The Spanish Post and Telegraph Authorities are inviting tenders for the concession for the working of the urban telephone system in Granada during a period of 15 years.

Talavera de la Reina (Province of Toledo).—The municipal authorities are at present inviting tenders for the concession for the electric lighting of the town during a period of four years.

Swindon.—March 20th. Steam coal for the electricity works. See "Official Notices" to-day.

Tipperary.—March 13th. Lighting the Union Workhouse premises from an electric or other installation. See "Official Notices" February 26th.

Whitchurch (near Cardiff).—March 17th. Electric light sundries for a year for the City of Cardiff Mental Hospital (form No. 24). Clerk and Steward of the Hospital.

Wolverhampton.—March 13th. Tramway track and contingent works (1¼ miles) for the T.C. G. Green, Borough Engineer.

March 26th. Renewal and subsequent maintenance of storage battery for the Guardians. See "Official Notices" to-day.

Wrexham.—March 13th. Materials for the Corporation electrical department. See "Official Notices" February 19th.

Yarmouth.—The T.C. on Tuesday authorised the general manager of the tramways to obtain quotations for 60 steel tires and 36 gear wheels.

York.—March 31st. Construction of 5½ miles of light railways in the city, and half-a-mile of railways within the rural district of Escrick, for the Corporation. See "Official Notices" March 5th.

CLOSED.

Accrington.—Messrs. Green & Co., in their tender for two batteries of economisers for the Electricity Committee, expressed their willingness to reduce these by 2½ per cent. It was resolved that, subject to the firm accepting £400, the work be placed in their hands. They have accepted the offer.

Acton.—The U.D.C. Electricity Committee on Monday accepted the following annual contracts:—

Steel tubing.—Perfecta Tube Co.
Meter boards.—Reason Manufacturing Co.
Bitumen.—Callender's Cable and Construction Co.
Cables.—St. Helens Cable Co.
Fuse boxes.—W. Lucy & Co.
Ordinary meters.—Venner & Co.
Assisted wiring, ordinary installations.—G. C. Berry.
Special installations.—J. H. Hewett and G. C. Berry.
Heating circuits.—Park Bros.

Blackburn.—The T.C. on March 4th approved of a contract with the Chloride Electrical Storage Co., Ltd., for a storage battery and booster for the electricity works; also of a contract with the British Westinghouse Co. for a motor-generator.

Bristol.—The Docks Committee has accepted the tender of Messrs. Johnson & Phillips, Ltd., for cables for the cold stores at Avonmouth; and that of the Metallic Seamless Tube Co. for conduits and fittings.

Canada.—Ottawa.—Tenders amounting to $750,000 were accepted by the Ontario Hydro-Electric Commission at the end of February for the equipment of distributing and transformer systems. The Canadian General Electric Co. will supply some two-thirds of the equipment, while the remainder will be supplied by the Canadian Westinghouse Co. The contracts include the equipments for 12 stations. The Commission have also entered into agreement for the right to erect towers on the casement plan, covering 85 per cent. of the total length of the line. Already the contractor for the erection of the line has commenced drawing material to convenient points, and the rolling of the steel for the towers will begin in a very short time now.

Fareham.—The U.D.C. has accepted the tender of the British Westinghouse Co. for a switchboard, at £421 10s. This is in place of the tender of the Accessories Co., who had made a mistake of £150 in their quotation.

Glasgow.—The Tramways Committee has accepted the following tenders:—

Renewable insert pieces for special work.—Acme Steel & Foundry Co.
Armature coils.—P. R. Jackson & Co.
Brakes for new cars.—British Westinghouse Electric & Manufacturing Co.

Italy.—The International Time Recorder Co. has just received an order for 16 of its automatic time recorders from the Italian Government.

London.—Woolwich.—The B.C. received the following tenders for service cables:—

		Per mile.	Total.
W. T. Henley's	(less 2½ per cent.)	£194	£388
Western Electric Co.		196	393
Callender's	(less 2½ per cent.)	196	393
Johnson & Phillips	(less 2½ per cent.)	196	393
W. T. Glover & Co.		197	395
Siemens Bros. & Co.	(accepted)	198	397

The Electricity Committee pointed out that Henley's cables would be manufactured at Northfleet. There was practically nothing to choose between the quality of the cables offered, as the whole of the firms tendering were well known and of good repute. The tender of Messrs. Siemens Bros. & Co. was the highest received, but having regard to the expense which would be incurred in carrying out tests, they had decided in favour of the Siemens tender, as the cable is to be manufactured in the borough.

Wandsworth.—For alterations to the electric light installation at the Newnes Public Library the Council has placed the contract with Messrs. Donnison, Sillem & Co.

Hackney.—It is recommended by the Electric Light Committee that the contract with the British Insulated and Helsby Cables, Ltd., for mains extension be further extended to Midsummer, 1909.

Hammersmith.—The Electricity Committee has recommended for acceptance the following tenders for annual requirements:—

Packing and jointing materials.—Witty & Wyatt, Ltd.
Tools, brushes and brooms.—F. Bird & Co.
Metals, gauge glasses, screws.—J. Gibb & Co.
Arc lamps, globes and shades.—H. G. Mayer & Co., Ltd.
Meters and electrical goods.—General Electric Co., Ltd.

In regard to meters, those most required are for a low average load (3, 5 or 10 amperes), and the tender of the General Electric Co. is lowest for English-made meters of these loads. For the electrical goods there were many tenderers, and the difference in prices was slight, so the tender of the General Electric Co. was accepted, as that "of a firm having local interests."

In connection with the supply to the White City, the B.C. electrical engineer reports that, instead of purchasing new switch-gear, it will be more economical to remove part of the original two-phase switchboard at the generating station, fix it at the Exhibition sub-stations, and add 12 more panels to the generating station main switchboard. He recommends that the 12 panels be purchased from Messrs. Cowans, Ltd., at £15 16s. each—the same price as paid last year for 20.

L.C.C.—The following tenders were received for the electric lighting, bells, and the wiring for ventilating fans for the extension of the L.C.C. School of Building, Brixton:—

Pinching & Walton	(accepted)	£1,167
G. E. Taylor & Co.		1,199
Tilley Bros.		1,248
J. Bryden & Sons		1,282
A. W. Penrose & Co., Ltd.		1,330
C. Pullan		1,530
Warren, Smith & Co.		1,920
(Engineer's estimate		£1,200)

It has been decided not to install gas lighting at the Redman's Road new elementary school, the Committee stating that, "having regard to the many advantages obtained by the use of the electric light, and to the fact that the average price paid for energy supplied to the Council's premises by the Stepney Borough Council is lower than in any other district," they have decided to use electric lighting instead; and after inviting tenders by public advertisement, they recommend the tender of the Harper Electric Co., at £335, for acceptance.

For renewals of special track-work during 1909-10, the tender of Hadfield's Steel Foundry Co., Ltd., at £7,472, has been accepted.

Battersea.—The B.C. has entered into an agreement with Callender's Cable and Construction Co., Ltd., for the supply of cables, &c., for the ensuing year.

Lowestoft.—The E.L. Committee has accepted the tender of W. T. Henley's Telegraph Works Co., Ltd., for house cut-outs at 3s. 10d. per pair for the coming year.

Maidstone.—For a new booster the T.C. received the following tenders:—

Veritys, Ltd. (accepted)	£88	Electromotors, Ltd.	£111
British Westinghouse Co.	99	General Electric Co.	112
Bruce Peebles & Co.	102	W. A. Stevens, Ltd.	118

New Atlantic Cable.—It is announced that the contract for the new cable of the Commercial Cable Co. for 1,700 miles, to complete the diversion of one of its trans-Atlantic cables from the Flemish Cap, in the Atlantic Ocean, to St. John's, Newfoundland, and thence direct to New York City, has been awarded to the Telegraph Construction and Maintenance Co., Ltd. The contract provides that the cable is to be in operation not later than August 1st.

Newcastle-under-Lyme.—The T.C. has accepted the tender of the Electrical Power Storage Co., Ltd., for two batteries, each of 130 cells of 360 ampere-hours capacity, at £275.

Plymouth.—The B.C. has received the following tenders for cables for the year 1909-10:—

	Average price.
*Aubert, Grenier & Co.	£94
*Victor Bornand & Co.	99
*Union Cable Co.	102
British Insulated and Helsby Cables, Ltd.	114
W. T. Glover & Co., Ltd.	116
Henley's Telegraph Works Co., Ltd.	116
Callender's Cable Co., Ltd.	116
*Lahmeyer Electrical Co.	116
Western Electric Co., Ltd.	117
Johnson & Phillips, Ltd.	118
Siemens Bros., Ltd.	118
W. Geipel & Co.	123
General Electric Co.	127

* Foreign manufacture.

For carbons the following tenders have been received:—

	Price per 1,000 ft.
G. Braulik (Conradty C)	£2 17 6
Johnson & Phillips, Ltd. (P grade open)	3 12 4
H. G. Mayer & Co. (Plania "Silesia")	3 14 3
M. Seeck (Luxor)	3 15 6
Ship Carbons, Ltd. (G quality Schiff & Co.)	3 19 8
Crompton & Co., Ltd. (Conradty C)	4 0 0
Sloan Electrical Co. (Conradty C)	4 0 0
Electrical Co. (Silesia B)	4 8 0
General Electric Co., Ltd. (Apostle)	4 8 9
British Westinghouse Co., Ltd. (Conradty C)	4 12 6
Haslam & Schontheil (Ship Carbons)	4 13 6
Geipel & Co. (Fabius Henrion)	4 18 0
Siemens Dynamo Works, Ltd. (Gebrueder Siemens)	5 17 4
Electrical Co. (Plania A)	10 10 0

Transformers:—

	A. Average price per kw.	B. Average price per kw.
British Electric Transformer Co., Ltd.	£1 17 0	£1 17 1
British Thomson Houston Co., Ltd.	2 9 11	1 8 6
British Westinghouse Co., Ltd.	1 14 4½	1 19 8
Brush Electrical Eng. Co., Ltd.	1 15 8	1 17 7
" " "	—	2 0 11
Burnand & Co.	1 11 1	1 7 8
Electrical Co.	1 2 8½	1 4 1½
Electrical Construction Co., Ltd.	1 16 7½	1 14 1
Ferranti, Ltd.	1 14 4½	1 17 4
Johnson & Phillips, Ltd.	1 13 7½	3 1 8
Siemens Bros., Ltd.	—	2 4 11½

House meters:—

	Average price.
British Westinghouse Co., Ltd.	£1 9 4
Ferranti, Ltd.	1 13 1½
Electrical Co.	1 13 8
General Electric Co., Ltd.	1 13 5
British Thomson-Houston Co., Ltd.	1 16 1
Marples & Leach	1 16 9
Gillespie & Beales	1 17 5
International Electric Co.	1 17 6
Siemens Bros., Ltd.	1 17 10
Spagnoletti, Ltd.	2 1 0
Bat Meter Co., Ltd.	2 3 0

Salford.—The Walsall Electrical Co., Ltd., of Liverpool, have secured the contract for laying the new distribution mains for the Stepping Hill Hospital, Salford.

Sandwich.—The T.C. has accepted the tender of Messrs. Stuart & Moore for an electric indicator for the waterworks, at £84 10s., this to include a year's maintenance.

Sheffield.—The Corporation electrical department has placed a contract with Messrs. Durham, Churchill & Co., of Grimesthorpe, Sheffield, for a second petrol motor tower wagon.

South Africa.—East Rand.—The East Rand Mines were recently in the market for three 3,000-kw. turbo-generators, complete with surface condensing plant, this being required for generating power for their own mines in preference to purchasing it from the Victoria Falls Power Co. We understand that a contract has just been entered into between the East Rand Mines and Messrs. Hubert Davies & Co., of Johannesburg, for the supply of plant, the mechanical portions of which are being built by Messrs. Willans & Robinson, Ltd., whereas the electrical portion is being manufactured by Messrs. Dick, Kerr & Co.

Todmorden.—The tender of Messrs. Fox & Co., Batley, has been accepted for the electric light installation at the new secondary schools.

Tunbridge Wells.—The T.C. has accepted the tender of the Underfeed Stoker Co., Ltd., for a mechanical stoker, motor, air conduits, &c., for one boiler at the electricity works, at £265.

West Ham.—The T.C. has placed an order with Rawlinson & Son, at £58 16s., for a new tower wagon for the tramways department.

CONTRACTORS' COLUMN.

[The following information is published in the interests of electrical contractors and others who are seeking for openings for new business. Considerable expense is incurred in the production of this column, and every care is taken to ensure that the information is new and accurate, but it will be understood that in a matter where so many correspondents are engaged, and where the amount of information to be handled is very large, this cannot always be guaranteed. If alleged inaccuracies are reported to the Editors, they will be fully investigated.]

ABER-BARGOED.—Police station; H. S. Gustard, clerk to County Council, Newport.

ABERDEEN.—Motor garage, shop alterations, &c., in Gordon Street; T. G. Archibald, architect, Huntly.

ACCRINGTON.—New Church to replace Huncoat Baptist Church (£2,100).

ALDERSHOT.—Alterations and additions to premises, Nelson Street, for R. Dickeson & Co., Ltd.; Friend & Lloyd, architects, Aldershot. Alterations, &c., Royal Arms Inn, Union Street; Friend & Lloyd, architects.

ALNWICK.—Workmen's dwellings for the U.D.C.; J. W. Douglas, architect, 40, Bondgate Without, Alnwick.

ALTRINCHAM.—New elementary school (between £9,000 and £10,000); J. Gerrard & Sons, Ltd., contractors, Swinton, Manchester. New school (£9,600); Clayton Bros., contractors, Poynton, Cheshire.

ARDSLEY.—Offices and depôt buildings; J. Morley, surveyor, Ardsley.

ASHBOURNE (Derbyshire).—Sewage works developments; R. Williams, clerk, Council Offices, Ashbourne.

ASKRIGG (Yorks.).—Church at Stalling Busk; T. G. Davidson, architect, 44, Great Russell Street, London, W.C.

ASTLEY (Lancs.).—New shop for Leigh Co-operative Society; C. Simpson, architect, The Avenue, Leigh. New colliery, Astley and Tyldesley Coal Co., Ltd.

ATHERSTONE.—Pumping station; H. J. Coleby, engineer, Atherstone.

BARGOED.—House and shop at Cardiff Road; I. Leyshon, architect, Bargoed. Thirty houses at Groesfaen; J. L. Smith, architect, 7, Victoria Square, Aberdare.

BARNSLEY.—Council School, Grove Street, for the T.C.; W. P. Donald, secretary, Education Offices.

BECKENHAM.—Six houses, Arrol Road; Golder & Co.

BEDFORD.—Additions to Shire Hall; W. H. Leete, County Surveyor, Bedford.

BELFAST.—New warehouse, Adelaide Street, for W. Adams & Co. (£4,500); Hobart & Heron, architects, Belfast.

BENTLEY (near Doncaster).—Important sewage scheme for Doncaster R.D.C.

BIRKBY (near Huddersfield).—Semi-detached houses, Wheathouse Road; N. Culley, architect, 13, John William Street, Huddersfield.

BIRMINGHAM.—Extension of the Municipal Technical School.

BLACKBURN.—School, Bangor Street, for the T.C.; Cooper & Slater, architects, Blackburn.

BLACKWOOD (Mon.).—New Welsh Calvinistic Methodist Chapel.

BLAINA (Mon.).—Forty-seven houses for the Griffin Building Club; W. Thomas, architect, Preswylfa, Nantyglo.

BLAKEY MOOR (Lancs.).—School (£11,000); Briggs & Wolstenholme, architects, May Buildings, 51, North John Street, Liverpool.

BLYTH.—Semi-detached villas; E. Cratney, architect, 161, High Street East, Wallsend-on-Tyne. Additions to Crofton School (£759); R. Grieves, surveyor, Blyth; J. & W. Simpson, builders, Morpeth Road, Waterloo.

BOLTON.—Mission hall, Commission Street (between £2,000 and £3,000); T. E. Smith & Son, architects, Central Chambers, Bolton.

BOX (Wilts.).—Villas, for J. E. Milsom; Herbert Blackford & Son, builders, Shelburne Road, Calne.

BRADFORD.—New electrical equipment at the Technical College (£746), also lighting and power plant for the college, School of Art and Textile Department (£9,726); W. Warburton, chairman of the Bradford Education Committee. Proposed conversion of Carlton Street Secondary Boys' School into a trade school; Director of Education, Bradford.

BRIDLINGTON.—Improvements and extensions to Hilderthorpe Hotel (£1,250), for Messrs. Alsopp; W. S. Walker, architect, Hull.

BRIGHOUSE.—Improvements and alterations at St. Martin's and St. Andrew's schools; D. Hardaker, chairman of the Brighouse Education Committee.

BRISTOL.—Public lavatories and conveniences at Eastville; police station at Stapleton; police and fire stations, Knowle, for the T.C.; T. H. Yabbicom, City Engineer, 63, Queen Square. New Primitive Methodist Church at High Littleton.

BRITTAS (Co. Dublin).—New sanatorium at Crooksling (electric light to be installed); G. T. Moore, architect, 1 and 2, Foster Place, Dublin.

BROMLEY.—Workshop, 1, London Road, and alterations to the Chatterton Arms public house, Chatterton Road; F. G. Crickett.

BROMSGROVE.—Higher education school in Stourbridge Road, for Worcestershire C.C.

BROUGHTY FERRY (Dundee).—Additions and alterations to Westlands House, for Geo. Ogilvie.

BRYNMAWR.—New business premises for A. T. Watkins; H. Waters, architect, Ebbw Vale.

BURNHAM (Somerset).—Proposed Council schools; B. C. Board.

BURNLEY.—Probable re-building after fire of premises, Elm Street and Cliff Street, occupied by Nuttall & Sutcliffe, tinplate workers, and others (damage over £2,000). Re-building of the Clock Face Inn, St. James' Street; Mr. Grimshaw, Keirby Brewery Co., Burnley. Craven Heifer Inn, Holden Street; Mr. Fernandez, Old Brewery, Burnley.

BURSLEM.—Flint grinding mill and premises, Newport Lane, for Oliver and Sons, Ltd.; R. Scrivener & Sons, architects, Hanley.

BURY.—Roller skating rink; J. Tinline, builder, Parker Street, Bury. New Roman Catholic School, Market Street; Rev. Dean Power, Bury. Ten houses and three shops, Chesham Road, Booth. Eleven houses, Ainsworth Road; J. Barlow. Alterations to Raven Hotel; Crown Brewery Co., Ltd. Two semi-detached houses; J. Hamer. Ten houses, Heywood Street; R. & J. Hall. Nine houses, Chesham New Road; A. Mills. School at Elton; F. S. Biram, architect, St. Helens, Lancs.

CAMBRIDGE.—Public conveniences; J. Julian, architect, Guildhall, Cambridge.

CAERAU.—New school; T. Mansel Franklen, clerk to the Glam. C.C., Cardiff. New church in the parish of Llangynwyd (£4,000).

CAERGWRLE (near Wrexham).—Rhyddyn Hall Hydro; C. D. Rutter, architect, Wrexham.

CARDIFF.—Conversion of laundry into female ward at workhouse; E. Seward, architect, Queen's Chambers, Queen Street, Cardiff. New Intermediate School for Boys; Teather and Wilson, architects, Andrew's Buildings, Queen Street, Cardiff. Bungalow, stable and coach-house, at Penylan Road; H. O. Shannon, builder, Cardiff. Two houses, at the Oval Roath Park; S. Hanson, builder, Cardiff.

CARLISLE.—Extensions at the Emperor Cafe, English Street, for L. and P. Smith; Mr. Rowntree, architect. Additions to Atlas Works, Nelson Street, for R. R. Buck & Sons, flannel manufacturers.

CARLOW.—Proposed Carnegie Free Library for Urban Council.

CARSHALTON.—Bungalow, Carshalton Park, for F. H. Roth. Houses, Hawthorn Road; Windebank & Co., builders, St. Olaves, Mulgrave Road, Sutton, Surrey.

CASTLETON (Derbyshire).—Proposed new Primitive Methodist Chapel.

CHAPEL-EN-LE-FRITH.—Proposed new Primitive Methodist Chapel.

CHARD.—Extensive alterations and additions to workhouse; F. G. Russ, clerk. New workshop, for J. Purse.

CHATHAM.—Probable rebuilding, after fire, of business premises, 189, High Street, for the International Stores, Ltd.; Mr. Ellis, manager. Store in Railway Street, for J. Fenner & Co. Addition to Eagle public-house, Military Road, for Style & Winch, Ltd.

CHEADLE.—Railway station; Ball & Robinson, builders, Stoke-on-Trent.

CHORLEY.—Rebuilding, after fire, of weaving shed; T. Heyworth & Co., Victoria Mill.

CLAYTON (near Bradford).—Workhouse extensions, for the North Bierley B. of G. (£4,711).

CLECKHEATON.—Pavilion, club and recreation rooms; Wm. Morton, architect, Cleckheaton.

CONISBOROUGH (near Rotherham).—School for the West Riding of Yorks C.C.; H. L. Smethurst, architect, Conisborough.

CREWE.—Eleven houses, Henry Street, C. H. Holmes. Shelters for consumptives at Isolation Hospital; Borough Engineer, Crewe.

CROMPTON (near Oldham).—Extensions to workshop, E. Load & Son; ten houses, Blakelock Street, Mrs. E. Buckley.

DENNY.—New railway station for the Caledonian Railway; Chief Engineer, Caledonian Railway, Buchanan Street Station, Glasgow.

DERBY.—Extension of Borough Asylum, for the T.C. (£1,200); B. S. Jacobs (Hull) and T. H. Thorpe (Derby), joint architects. Alterations and additions to hospital; W. Ford & Son, contractors, Derby. Alterations at Full Street Baths; Parker & Son, contractors, Derby. Municipal reading rooms; Borough Engineer, Derby.

DONCASTER.—Girls' high school (£12,000); J. M. Bottomley, Son & Wellburn, architects, Leeds. New Catholic Schools, Lord Street.

DUBLIN.—Dental hospital (£2,500); Dental Hospital Committee.

DUMFRIES.—Proposed Town Hall and municipal buildings (£17,500); Franci Armstrong, burgh surveyor.

DUNDEE.—Additions to premises of the Y.W.C.A. (£1,000).

DUNFERMLINE.—Technical school; H. & D. Barclay, architects, 243, St. Vincent Street, Glasgow. Shop and houses in Albany Street, for J. P. Watters, butcher, 4, Albany Street.

DURHAM.—Business premises for the Sherburn Hill Co-operative Society; nine houses. Sherburn Hill, for Lambton Collieries, Ltd.

EARSDON.—Council chambers and offices; J. R. McMillan, Earsdon.

EAST GRINSTEAD.—Refuse destructor and abattoir; W. E. Woolam, engineer, U.D.C., East Grinstead.

ECCLES.—Town Hall Hotel to be rebuilt (£3,500 to £4,000); N. H. Hacking, architect, 50, Blackfriars Street, Manchester; Watson & Woodhead, brewers, Salford, owners.

EDGELEY (Stockport).—Primitive Methodist Church and schools; Wrathmell and Blackshaw, architects, Queen's Buildings, St. Peter's Square, Stockport.

EDINBURGH.—Concert hall and main hall at new Marine Gardens, for Edinburgh Marine Gardens Co., Ltd.; laundry in Tower Street, Portobello, for T. R. Jones.

ELLAND.—Three shops; C. H. Petty, architect, 12, Waterhouse Street, Halifax.

ELTHAM.—Eight houses, Greenvale and Glenhouse Roads; J. J. Bassett, 121, Earlshall Road, Eltham.

EPSOM.—Additions to riding school, for J. Coleman; eight houses on the Hylands Estate, for Gordon Smith.

EXETER.—Additions to St. Thomas's Workhouse; J. Stocker, architect, Cowick Street, Exeter.

EXMOUTH.—Villa, in Cranford Avenue; L. Thomas, Wherringan, Exmouth. Villa, Saltorton Road; H. J. G. Lang, Exmouth. Banking premises, for Lloyd's, Ltd.; Waller & Son, architects, Gloucester. Alterations to villa; Lady Price, Cranford Avenue, Exmouth.

FALMOUTH.—Additions to County High School; S. Hill, architect, Redruth. Extension of the Liverpool Steamers' shed at the Western Wharf, for the Falmouth Docks Co.

FARNWORTH (near Bolton).—Houses, Darley Grove, J. E. Nicholson; two shops, Church Street, J. Lomax; 14 houses, Harper Green, Joseph Lees; alterations to workshops, Messrs. G. R. Feather & Co.

FLIXTON (near Manchester).—Additions to the Roebuck Hotel, for W. G. Coombs.

FOLKESTONE.—Four houses in Dover Road; Wm. Smith, builder, Folkestone. Two houses in Dover Road; G. H. Camburn, architect, Folkestone; S. Binfield, builder, Folkestone.

GABALFA (Cardiff).—Six houses, Heathfield Road; Miles Bros., builders. Eleven houses, Canada Road; Jas. Galsworthy, builder, Llandaff. Eight houses, Newfoundland Road; L. H. Nash, builder, Cardiff. Eleven houses, Aprica Gardens; S. J. Grinter.

GARSTANG.—Proposed new railway station; Garstang and Knott End Railway Co.

GATESHEAD.—New Primitive Methodist Church and Schools (£6,000); Marshall & Tweedy, architects, 17, Eldon Square, Newcastle-on-Tyne.

GILLINGHAM.—Houses, Rock Avenue, for W. Dobson, builder, 2, Linden Road; Richmond Road, for T. Cornelius and Son, builders, Avondale.

GLASGOW.—Prospective rebuilding, after fire, of Partick Flour Mills, for J. White & Sons. Justiciary Court (£10,000); Clark & Bell, architects, 212, St. Vincent Street, Glasgow.

GRANTHAM.—Houses, Welby Row, for S. Bentley-Rudd; Edward Street, for C. J. Davis; Houghton Road, for G. W. Cullen.

GOMERSAL (Yorks).—Weaving shed, Union Mills, for Firth, Penny & Co.

GOUROCK.—New Roman Catholic School in Royal Street; Priest-in-charge, St. Ninian's R.C. Church, Gourock.

GREAT LEVER.—Two villas, Smith's Road, for J. Bramhall.

GREENOCK.—Store at worsted mills, Drumfrochar Road, for Fleming, Reid and Co. Alterations and additions to the Infirmary.

GRETNA.—Reconstruction of Gretna Church; J. Barber & Bowie, architects, Dumfries.

GUILDFORD.—Parish Hall for Holy Trinity and St. Mary (£2,000).

HALE (Cheshire).—Proposed new Congregational Church (£8,000).

HANLEY.—Additions to Eastwood Pottery, for J. & G. Meakin, Ltd.; R. Scrivener & Sons, architects, Hanley.

HASLINGDEN.—Extensions to mill; Hazell Manufacturing Co. Church; R. T. Longden, architect, Leek.

HAVERFORDWEST.—Market buildings; W. Bevan, architect, Haverfordwest.

HERNE BAY.—House, corner of Sea Street and Albany Drive, for J. F. Thompson; R. A. Messenger, architect, 16, High Street. House, Fernlea Avenue, for A. Gibson.

HEYWOOD.—Two underground conveniences; J. Settle, architect, Heywood.

HIRWAIN (near Aberdare).—Villa residence for W. M. Lloyd; T. Roderick, architect, Clifton Street, Aberdare.

HITCHIN.—Detached residence, Old Park Road, for Mrs. Reynolds. Houses, Lancaster Avenue, for T. Males.

HOLYHEAD.—Engine house and filter-bed (£2,274); H. Rofe & Son, engineers, 8, Victoria Street, Westminster; E. R. Lester, builders, Plymouth.

HOYLAKE.—Queen Victoria Cottage Hospital (£3,000); E. Ware, architect.

HUDDERSFIELD.—Palace Theatre (£11,600); R. Horsfall & Son, architects, 22a, Commercial Street, Halifax; Smith Bros., builders, Burnley. Baptist church and school at Birkby; Garside & Pennington, architects, Central Chambers, Wesley Street, Castleford.

HULL.—Extension of Madeley Street Baths; A. E. White, city engineer, Town Hall, Hull. Houses, Devon Street, for Mrs. J. Smith; Ventnor Street, for G. T. Spruit; Marfleet, for G. H. Needler; Lee Street, for J. E. Wray; Marfleet, for G. E. Kirkwood; Garden Village, for Garden Village, Ltd.; Auckland Avenue, for H. Sanderson; Cranbrooke Avenue, for Mr. Garton, builder, 105, Day Street. Five shops, Hessle Road, for R. Smith & Son; additions to premises, Cholmley Street, for the Co-operative Society; warehouse, Wilmington, for D. Hurtley & Son, Ltd., millers; additions to premises, South Coates Lane, for Taylor's Laundry, Ltd.

ILFORD.—Roller skating rink for Skating Rinks, Ltd. (£4,000); James Carmody, secretary, 4, Cranbrook Park Road, Ilford.

INVERNESS.—New premises for Farmers' Dairy Co. in Lochalsh Road; Secretary, Farmers' Dairy Co.

ISLE OF MAN.—Additions to baths; F. Cottle, architect, Douglas, Isle of Man.

KEARSLEY (near Bolton).—Electrical installation at joinery works; Mr. Chynoweth.

KING'S HEATH (near Birmingham).—Additions, including smoke room and large assembly room, at the Hare and Hounds Hotel, for the Holt Brewery, Ltd., Birmingham; C. H. Collett, architect, 94, Imperial Arcade, Birmingham.

KING'S LYNN.—Additions to baths; J. H. Webb, borough engineer, King's Lynn.

KIRKHAM (Lancs.).—New fire station, stables, &c. (£1,000); Surveyor, Council Offices, Kirkham.

LARNE.—Proposed new technical school (£4,000).

LEEDS.—Offices for the Pearl Assurance Co.; W. Bakewell, architect, 38, Park Square, Leeds.

LEICESTER.—New United Methodist Church (£3,000); Rev. D. B. Proudlove, pastor, Harrison Mission, Leicester. United Methodist Church and school at Oadby.

LINCOLN.—Additions to the Saracen's Head Hotel (£1,040); W. Watkins and Son, architects. Co-operative Society Building Department, builders. Church at Newport, for the Vicar and Churchwardens; shop, Bargeholme Road, for the Co-operative Society; houses, Lealby Street, for C. E. Stiles; Burton Road, for the Lincoln Land and Building Society; Carholme Road, for H. Ullman; Mill Road, for C. Dowse.

LITTLE HULTON (near Bolton).—Further mill extensions; Suez Mill Co.

LONDON (Hackney, N.E.).—Additions to Wesleyan Mission premises, junction of Daintry and Mallard Streets, Hackney Wick; J. D. & S. J. Mould, Building, Sidney Road, for the Crown Perfumery Co., 108 and 109, Fore Street, E.C.

(Clerkenwell, E.C.).—Warehouses for the Crippleage Society; J. Greenwood & Son, builders, Arthur Street, W.

(City Road, E.C.).—Workmen's dwellings (£5,560); E. C. P. Monson, architect, Finsbury Pavement House, E.C.; Cubitt & Co., builders, Gray's Inn Road, W.C.

(Plumstead, S.E.).—Billiard room for Conservative Club, 33-35, Plumstead Common Road.

(Silvertown, E.).—Alterations to premises, for H. Tate & Son, sugar refiners, Silvertown.

(Stratford, E.).—Billiard room, for M. W. Hudson, 155, Romford Road, Stratford.

(Portland Place, W.).—"Radium Institute," in Riding House Street; T. P. Figgis, architect, 28, Martin's Lane, Cannon Street, E.C.

(Regent Street, W.).—Alteration of 316, Regent Street, for temporary class purposes; the Governors of the Regent Street Polytechnic.

(Finchley, N.).—Three stables and one bakehouse, Cornwall Avenue; Sir H. White, solicitor, 6, The Knoll, Beckenham. Factory premises, rear of Seymour Terrace, North Finchley, for the Manor Farm Dairy Co., Ltd.

(Hammersmith, W.).—Mains to be extended to premises in Waldo Avenue for Mr. Findlay (two 2-h.p. motors and 60 lamps). Mains to be extended to the Children's Receiving Home and to Electric Theatre (G. Hurst), Trenmar Gardens.

(Lewisham, S.E.).—Sunday schools at rear of the Wesleyan Church, Rushey Green; H. Hopton. Four houses, Thornwood Road; W. J. Scudamore & Sons, builders, 13, Manor Lane, Lee, S.E.

(Whitechapel, E.).—Building at 6, Holloway Street, for H. M. Miller.

(Wimbledon, S.W.).—Workshops, rear 22, St. George's Road; Price and Price, builders, 20, St. George's Road, Wimbledon. Proposed new hospital for the Wimbledon and Merton Hospital Building Committee (£5,000); H. M. Ellis, hon. sec.

(Clapham, S.W.).—Billiard hall, corner of Cato Road and High Street.

(Wandsworth, S.W.).—Billiard hall, corner of Balham High Road and Marius Road.

(S.E.).—Building in Briant Street, New Cross; L. V. Hunt, 34, Queen Street, E.C.

(Whitechapel, E.).—Buildings in Hope Street; A. Davis.

(Southwark, S.E.).—Additions to premises of the Maltina Bakeries, Ltd., Webber Street; W. Egerton, architect, 12, Queen's Road, Erith, Kent.

(Old Montague Street, E.).—Additions to Whitechapel Foundation School, for the Governors.

(Crofton Park, S.E.).—Buildings, Manwood Road; J. W. Webb, Salehurst Road, Brockley, S.E.

(Poplar, E.).—Manual training centre, at Woolmore Street Schools, for the L.C.C.

LOSTWITHIEL.—Three houses, for the Lostwithiel Building Co., Ltd. (£960); W. T. Stevenson, builder.

LUTON.—New schools, Beech Hill, for the T.C. (£9,000); houses, Ashburnham Road, for S. W. Johnson; Naseby Road, for E. Hillyard; Reginald Street, for A. Carter; Wimbourne Road, for A. Turner, builder, 72, Hibbert Street; Newcombe Road, for Hill Bros., and E. Hill; Naseby Road, for T. Day; Havelock Road, for Wm. Baxter; Conway Road, for A. Attwood, builder, 34, Ashton Road; additions to premises, Bute Street, for Vyse, Sons & Co., Ltd. Probable re-instatement, after fire, of business premises, 39, George Street; Henry Brown & Sons, timber merchants, owners.

MAIDSTONE.—Two houses, Sheal's Crescent, for J. J. Hunn, builder, 60, Upper Fant Road.

MANCHESTER.—Probable re-erection (after fire) of premises, rear of St. Peter's Square, occupied by A. K. Dyson and others (damage between £15,000 and £20,000); proposed garden city at Chorlton-cum-Hardy (400 houses).

MANSFIELD WOODHOUSE.—Proposed public offices, for the U.D.C. (£1,200).

MARNHULL (Sturminster Newton, Dorset).—Probable re-erection (after fire) of business premises, for Hayter & Sons (damage, £4,000 to £5,000).

MERSTHAM (Surrey).—House, shop and workshop, Station Road, for C. Adamstone, High Street.

MIDSOMER NORTON (near Bath).—Sewerage school, Westfield, for the U.D.C.; Wm. F. Bird, engineer, Midsomer Norton.

MILLOM (Cumberland).—Hall and institute for St. Luke's Church, Haverigg; H. Park, 11, Bankfield Road, Haverigg, Millom.

NEATH.—Congregational Church and schools at Onllwyn; W. B. Rees, architect, 3, Dumfries Place, Cardiff.

NEWCASTLE-ON-TYNE.—Hotel (85 bedrooms) in Bewick Street and Pink Lane; Newcombe & Newcombe, architects, 69, Pilgrim Street, Newcastle; J. Smart, contractor. Conservative Club; Cackett and Burns-Dick, architects, Pilgrim Street, Newcastle-on-Tyne.

NEWCASTLE-UNDER-LYME.—New Wesleyan Sunday Schools; Garside and Pennington, architects, Pontefract and Castleford.

NEWQUAY.—Offices and shop; Mr. Snell, Bank Street.

NEW SPRINGS (near Wigan).—New Council school in Ash Lane.

NORTHAMPTON.—Proposed new place of worship for Abington Avenue Congregational Church (nearly £4,000); Rev. C. S. Larkman, pastor.

NORTH ORMESBY (near Middlesbrough).—Proposed new Primitive Methodist church and schools.

NOTTINGHAM.—Junior and infants' school and technical centre, Stanley Road, Nottingham; F. B. Lewis, city architect, Guildhall, Nottingham. Prospective re-building, after fire, of offices for the Nottinghamshire Education Committee.

NORTHWICH.—Proposed important sewage disposal works (£10,000); Surveyor, Council Offices, Northwich.

OAKHAM.—Alterations at Melton Road Baptist Church (£700); Rev. H. T. N. Ussher, pastor.

OLDHAM.—Premises, Rhodes Bank (£3,000); Squire Ashton & Son, Ltd., builders, Cheapside, Oldham. Alterations and enlargement of premises, for the Worcestershire Furnishing Co., 211, Manchester Street. Proposed conversion of small-pox hospital into consumptive sanatorium; Borough Engineer. Enlargement of the premises of the Free Church Federation (£7,000). Twelve houses, Kirkham Street; J. W. B. Mellor, architect, 275, West Street, Oldham.

PENDLETON.—Probable re-erection, after fire, of premises in Brighouse Street, for Fearnley & Sons, joiners and builders.

PENN (Bucks.),—School (£1,800); C. H. Townsend, architect, 32, Great George Street, S.W.

PENTYRCH.—Four houses, Pentwyn; Thos. Evans, builder.

PERTH.—Alterations and additions at Pitcullen for Murray's Royal Asylum; Mr. Rew, George Street. Seven double villas for David Squire Young, Upper Craigie, Perth.

PLYMOUTH.—Presbyterian and Roman Catholic Church, junction of Holland Road and Home Park Avenue. Church; Scoles & Raymond, architects, Basingstoke; A. N. Coles, builder, Plymouth.

PONTLLANFRAITH (Mon.).—New Infant School (260 children); C. Dauncey, County Council Offices, Newport.

PORTHCAWL (Bridgend).—New church, Newton Nottage (£6,045).

PORT TALBOT.—New church, parish of St. Agnes (£6,000).

QUARTER (N.B.).—Institute for miners; J. B. Crump, Hamilton Estate Office, Motherwell.

RADCLIFFE (Lancs.).—New weaving shed for J. C. Hamer & Co., Ltd., Hope Mills.

RADYR (Cardiff).—Two semi-detached villas, near Woodfield Terrace; John Harry, builder, Radyr.

READING.—New skating rink; W. G. Millar, architect, 1, Arcade Chambers, Friar Street, Reading. Store for J. H. Fuller & Co., Ltd., 52, Munster Street, Reading; six houses in Grange Avenue, for B. Batten; two houses in Whitley Wood Lane, for G. Gibbons; two houses in Whitley Wood Lane for F. Barnett. Public conveniences for the T.C.; John Bowen, borough engineer.

RHYMNEY (Mon.).—Enlargement of mixed Council school at Middle Rhymney; C. Dauncey, County Council offices, Newport, Mon.

ROCHDALE.—Alterations at Bridge Inn, Castleton; alterations at Pine Apple Inn, Whitehall Street. Proposed new church, St. Mary's parish, Wardleworth (£12,000); Rev. A. R. L. Brown, vicar. New United Methodist Church, Baillie Street Circuit.

ROTHERHAM.—Five houses, Aldred Street, for Richard Watson, Godstone Road. Warehouse for the Masborough Equitable Pioneers' Society, Ltd.; J. Platts, architect, Old Bank Buildings, High Street, Rotherham. Twelve dwelling houses, for J. H. James, Cavendish Road; enlargement of existing workshop and additional workshop, Fitzwilliam Road, for H. Page; four dwelling houses for Ball & Waite, Wellgate; ten dwelling houses for Herbert James, Bramwell Street and Hatherley Road; small-pox hospital, Kimberworth; J. S. Naylor, borough engineer; Rotherham; eight dwelling houses for R. Watson, Aldred Street; new mission hall in connection with Rotherham parish church.

ROYTON.—Public mortuary; S. and J. Smethurst, Ltd., contractors.

RUNCORN.—Thirteen houses, for S. Riley; houses, Oxford Road, for the Co-operative Society. Additions to Hospital (£8,000); J. Wilding, Borough Surveyer, Runcorn.

ST. ANDREWS.—Four houses at Dinas Powis; Austin Davies, builder, Dinas Powis. Two houses at Westra; J. Howells, Westra, St. Andrews.

ST. AUSTELL.—Waterworks plant, pumps and engines, for the R.D.C.; H. S. Hancock, engineer, Sydney Place, St. Austell. Three houses in Highfield Avenue, for Capt. J. Mably, Ranelagh Road.

SEDGEFIELD (near Ferry Hill).—Primitive Methodist Church, Chilton Buildings; eighteen houses, rear of Lillie Terrace, Trimdon Grange, for Wilkinson, Wanless & Orton.

SENGHENYDD.—New Constitutional Club; A. O Evans, Williams & Evans, architects, Post Office Chambers, Pontypridd.

SHEFFIELD.—Houses, Westwood Road, Nether Green; Marten & Hughes, builders. New Primitive Methodist Church and Schools in Junction Road.

SKYE.—Alterations at Uig Hotel, Skye, and additions to Conon shooting lodge, Uig; Walter G. Coles, engineer, 122, George Street, Edinburgh.

SLEAFORD.—Alterations and additions to place of worship, to be lit by electricity; A. E. Lambert, architect, 22, Park Row, Nottingham.

SOUTHAMPTON.—Church Institute; S. Greenwood, architect, Portland Street, Southampton.

SOUTH MOLTON (Devon).—Church Hall; E. R. Groves, architect; W. Sanders & Son, builders.

SOUTH SHIELDS.—Shop premises, 7, Burrow Street, for W. Allon; F. Rennoldson, architect, 37, King Street, South Shields.

SPENNYMOOR (Co. Durham).—Houses, Eden Road, for W. Thompson; Carlton Terrace, for T. Barker.

STARBECK (near Harrogate).—Re-building St. Andrew's Church; Austin and Paley, architects, Lancaster.

STOCKPORT.—Twenty-two houses, Woodville Estate, South Reddish, for Wm. Newbould.

STONE (Kent).—School; W. H. Robinson, architect, Kent Education Committee. Caxton House, Westminster.

SUNDERLAND.—New Presbyterian Church at Roker.

SUTTON (St. Helens).—New monastery, "St. Anne's Retreat"; R. Curran and Sons, architects, Warrington.

SWINDON.—Houses, Bath Road; Drew & Sons, architects, 20, Regent Circus; H. & C. Spackman, builders, Hunt Street; Wootton Bassett Road; A. J. Colborne, builder.

TAUNTON.—New Mission Church, St. Mary's parish; Archdeacon Askwith. Extension of Museum (£600); J. H. Spencer, architect, 5, Hammet Street, Taunton.

TANFIELD (Co. Durham).—Alterations and repairs to Council school; County Education architect, Shire Hall, Durham.

TONBRIDGE.—Pair of villas, Mabledon Road; W. Groombridge, builder, 6, Waterloo Road. Detached residence, Springwell Road, for Max Warren.

TUNBRIDGE WELLS.—Additions to Woodlands, Pembury Road, for F. Weare.

TUNSTALL.—Wesleyan Church (£1,800); H. Dacre, Tunstall, architect; P. Pemberton, builder, Tunstall.

TURRIFF.—Additions and alterations to shop and house in Cunniestown, for W. Teunon & Sons, Fife Street, Turriff.

ULLAPOOL.—Restoration of U.F. Church; Wm. Mackenzie, architect, Dingwall.

WAKEFIELD.—Proposed new music hall, Kirkgate (£9,000); F. Matcham, architect, 9, Warwick Court, Holborn, London, W.C.

WALKDEN.—Blocks of semi-detached houses, for local Co-operative Society; Joseph Bridge, James Shiel and J. L. Owen & Sons, builders, Walkden.

WALLASEY.—Extension of refuse destructor buildings, for the U.D.C. (£1,066); Thos. Spencer, builder, Aintree.

WALSALL.—Additions to generating station, Wolverhampton Street (£35,000); Alexander Wyllie, electrical engineer, Walsall T.C. Prospective rebuilding of portion of brush works, Freer Street, after fire, for Vale & Bradnock.

WALSINGHAM (Norfolk).—Oddfellows' Hall; F. K. Hawes, architect, Holkham; Messrs. Cornish, builders.

WARWICK.—Houses, Longbridge; Capt. R. Airth Richardson, Snitterfield, Stratford-on-Avon.

WATFORD.—Motor house, Fairview, Haddor Road, for J. W. Colley.

WELLINGTON (Somerset).—Additions to White Hart Hotel, for Norman Langton; Mr. Howard, architect.

WESCOL.—Memorial hall; Eames & Green, architects, Blackburn; Whittaker and Co., builders, Blackburn.

WESTGATE-ON-SEA (Kent).—Public conveniences for P.C.; G. Lockwood, builder, Westgate-on-Sea.

WEST HARTLEPOOL.—New theatre; W. & T. R. Milburn, architects, 20, Fawcett Street, Sunderland.

WESTON-SUPER-MARE.—Additions to parish church; Preb. de Salis.

WEYMOUTH.—School; E. J. Bennett, architect, 10, Gloucester Street, Weymouth.

WHITBY—Villa in Ruswarp Lane; E. H. Smales, architect, Arundel House, Stakesby, Whitby.

WHITCHURCH.—Six houses at The Avenue; S. Shail, builder, Cardiff.

WHITEFIELD (Lancs.),—House, stables, &c., for Jas. Haworth; H. Nuttall, architects, 20, Market Street, Bury.

WIGAN.—Six houses off Chapel Street, P. Gaskell; two houses in Chapel Street, J. Rigby; house with shop, Warrington Lane, J. Brown; four houses, Albert Street, Wm. France: five houses, Ann Street, Miss M. C. Wood: rebuilding of Bird-i'-th'-Hand Inn, Gidlow Lane, for Peter Walker & Son, Ltd.; alterations to late Bay Horse Inn, Ormskirk Road, for J. Haggerty. Church; J. B. Thorneley, architect, Wigan; J. Wilson, builder, Caroline Street, Wigan.

WOLSTANTON (N. Staffs.).—Eighteen houses, Dimsdale Parade; J. Cooke.

WOLVERHAMPTON.—Additions to skating rink, Birch Street; Lovatt, Ltd., builders, Darlington Street, Wolverhampton.

WORCESTER.—Prospective restoration, after fire, of the Parcels office of R. T. Smith & Co., The Foregate, Worcester.

WORTHING.—Additions to Baptist Church, Broadwater; T. R. Hyde, architect. Three pairs of semi-detached houses, in St. Michael's Road, for Adams Bros.; alterations and additions to 43, Chapel Road, for Cameron & Co. Alterations and additions to premises, Broadway, for Iven & Kellett; J. E. Lund, architect, The Cove, Christchurch Road, Worthing. Seven houses in Heene Road; G. Baker.

YNYSHIR (near Pontypridd).—New Calvinistic Methodist Church and Schools; R. S. Griffiths, architect, Tonypandy.

YORK.—Sunday Schools, &c., Holgate; T. Monkman, architect, St. Martin's House, Micklegate, York. Extensive alterations and improvements at the North Eastern Railway Station, including signal cabin with 290 levers; W. J. Cudworth, engineer to the company, York.

FORTHCOMING EVENTS.

Northampton Institute Engineering Society.—Friday, March 12th. Paper on "Smoke," by Mr. W. Longland.

Physical Society.—Friday, March 12th. At 8 p.m. At the Imperial College of Science, South Kensington, S.W. Papers on "The Effect of Radiations on the Brush Discharge," by Mr. A. E. Garrett. and "Pirani's Method of Measuring the Self-Inductance of a Coil," by Mr. E. C. Snow; "Exhibition of a High Potential Primary Battery," by Mr. W. S. Tucker.

South-Western Polytechnic, Manresa Road, Chelsea, S.W.—Friday, March 12th. At 8 p.m. Distribution of prizes and certificates by Prof. H. A. Miers.

Royal Institution.—Friday, March 12th. At 9 p.m. Discourse on "Modern Submarine Telegraphy," by Mr. S. G. Brown.

Saturday, March 13th.—At 3 p.m. Lecture on "Properties of Matter," by Prof. Sir J. J. Thomson. (Lecture III.)

Friday, March 19th.—At 9 p.m. Paper on "Experiments at High Temperatures and Pressures," by Mr. R. Threlfall.

Saturday, March 20th.—At 3 p.m. Lecture on "The Properties of Matter," by Sir J. J. Thomson. (Lecture IV.)

Institution of Electrical Engineers (Glasgow Students' Section).—Saturday, March 13th. Visit to the works of Messrs. P. & W. McLellan, Ltd., Plantation. Meet at works at 3 p.m.

Friday, March 19th.—At 8 p.m. At the Technical College, Glasgow. Paper on "Electrically-Driven Centrifugals and Accessories," by Mr. J. H. McMinn.

Institute of Marine Engineers.—Monday, March 15th. At 7.30 p.m. At the London Institution, E.C. Mr. W. P. Durtnall's reply to discussion on paper on "The Electrical Transmission of Power for Main Marine Propulsion."

Junior Institution of Engineers.—Monday, March 15th. At 7.30 p.m. At the Royal United Service Institution, Whitehall. Paper on "The Use of Dielectrics and the Principal Tests Applied to Them," by Messrs. T. Germann and S. M. Hills.

Saturday, March 20th.—At 7.30 p.m. At Caxton Hall, Westminster. Conversazione.

Institution of Electrical Engineers (Manchester Students' Section).—Tuesday, March 16th. At 7.30 p.m. At the Municipal School of Technology, Manchester. Annual general meeting. Paper on "Electrolytic Zinc Manufacture," by Mr. F. Moore.

Institution of Electrical Engineers (Students' Section).—Wednesday, March 17th. At 7.45 p.m. Meeting at the Library of the Institution. Paper on "Central Station E.H.T. Switchgear," by Mr. E. F. Hetherington.

Institution of Electrical Engineers (Glasgow Section).—Friday, March 19th. At 8 p.m. At 2.7, Bath Street, Glasgow. Paper on "Notes on Safety of Working Electrical Plants in Coal Mines," by Mr S. A. Simon. (Postponed meeting of Tuesday, March 9th.)

THE ELECTRICAL ENGINEERS
(LONDON DIVISION).

The following orders are issued:—

Commanding Officer—Col. R. E. B. Crompton, C.B.

Monday, March 15th.—"A" Company. Infantry drill, 6 to 7 p.m. Technical drill, 7 to 9.30 p.m.

Tuesday, March 16th.—"B" Company. Infantry drill, 7 to 7.45 p.m. Technical drill, 7 to 9.30 p.m.

Thursday, March 18th.—"C" Company. Infantry drill, 6 to 7 p.m. Technical drill, 7 to 9.30 p.m.

Friday, March 19th.—"D" Company. Infantry drill, 6 to 7 p.m. Technical drill, 7.15 to 9.30 p.m.

(The infantry drill mentioned above is for recruits.)

Saturday, March 20th.—Week-end run for "B" Company at Coalhouse Fort.

(Signed) J. H. S. Phillips,
Capt. and Acting Adjutant.

12, 1909.

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LIPS,
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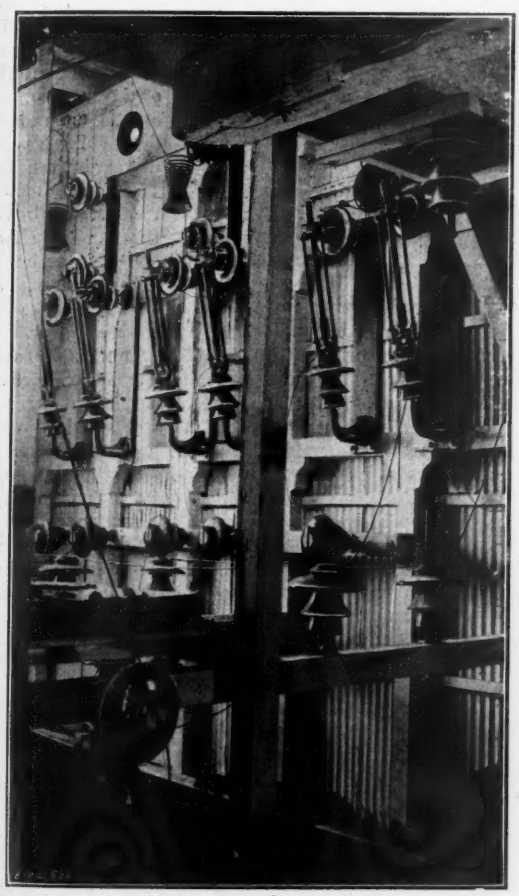
THE JHELUM RIVER POWER DEVELOPMENT.

By WILLIAM T. TAYLOR, M.I.E.E.

(*Concluded from page* 392.)

The high-tension delta connections are made by insulators supported from the sub-station roof directly above the two transformer banks, and the wires drop straight to the transformer terminals. The low-tension delta connections are made on wires supported by insulators fastened on the walls on both sides of the sub-station. From the transformer they lead to an automatic triple-pole oil switch, which connects each bank of transformers to the low-tension bus-bars. From the latter six air-break single pole disconnecting switches are tapped off, three for each outgoing low-tension line. Both of these lines leave the sub-station on the shore side at one end.



60,000-volt Expulsion Fuses, in Floating Sub-station.

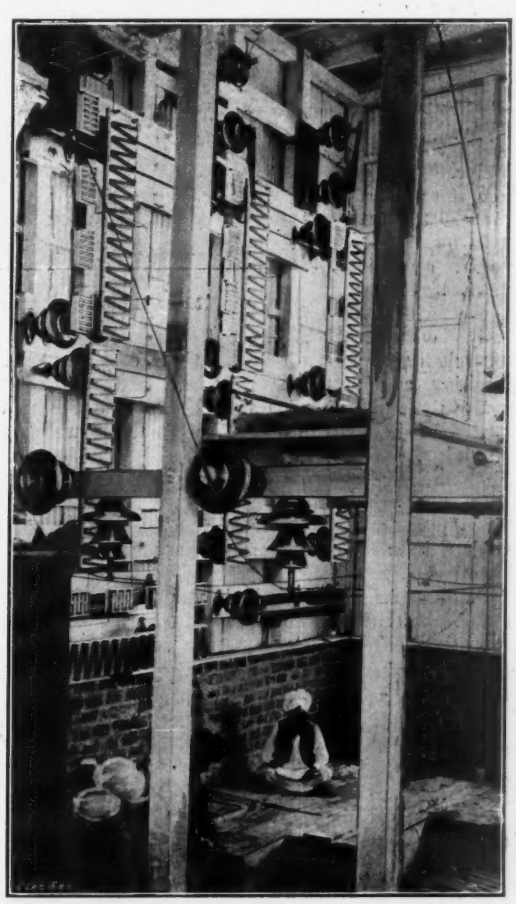
The other floating sub-station is equipped with three 200-kw. transformers, and the arrangement is somewhat similar throughout to the one mentioned.

At each end of the sub-stations "spuds" are fitted and driven into the soft mud at the bottom of river. This is the method used for anchoring the sub-stations while the 60,000 and 2,300-volt lines are connected.

All the transformers are wedged (back and front) to stop them from moving when the sub-stations sway during heavy winds.

Connected to each transformer is a unique oil relief valve, or swan-neck arrangement of pipe, 2½ in. diameter, filled with oil at the neck to a depth of 6 in., which operates when a heavy volume of gas is formed at the top of transformer, thus relieving the tank from any undue strain, or the chance of blowing the top off the transformer.

The low-tension lines leave No. 1 sub-station and branch off from the first pole structure in two directions, one going north and the other south. They can be operated independently or in parallel, as the case may be, by closing or opening a sectionalising switch on the bus-bars.



Lightning Arresters in Floating Sub-station.

The two hydraulic dredges—"Jammu" and "Kashmir"—operate at a distance of 150 ft. from the shore. Connections from the line to the dredges are made by special brass clamps, fastened to conductors leading from the line down the pole, to within 7 ft. from the ground, to the end of an armoured cable lashed to the pole. This cable is some 500 ft. long, supported on rectangular wooden pontoons spaced 18 ft. apart and fastened between the spans by planks on swivels. The cable is coupled at the dredge to a triple-pole oil-switch. From this switch the wires are carried on insulators to the operating room, located on the front part of the upper deck of the dredge.

The two hydraulic dredges are similarly equipped. Each

dredge has one 350-H.P. 2,300-volt three-phase induction motor, which delivers on an average 350 H.P. continuously, at about 290 R.P.M. in all cases. This motor is for operating the main pump, to which it is direct connected.

The cutter-head motor is of 150 H.P. (2,300-volt, three-phase), and is operated through a triple-pole oil-switch and a permanent water-cooled rheostat of ·21 ohm resistance and 340-ampere capacity. This rheostat consists of three separate resistance grids mounted in a three-compartment tank for water-cooling purposes. The suction pipe with its revolving head is driven through shaft, gearing, and a cone-shaped friction pinion by this motor.

The bow-winch motor is of 50 H.P. (2,300-volt, three-phase), operated by a railway controller located in the operating room. The bow winch has two 27-in. dia. drums for the swinging lines, and one 16-in. dia. drum for hoisting the suction pipe.

The stern-winch motor is of 30 H.P. (2,300-volt, three-phase), and is operated by throwing the windings directly on the 2,300-volt lines. This winch has three cable drums, two for raising and lowering the spuds, and one for the thrust of the walking spud, by which the dredge is moved along. The drums are handled by friction clutches and hand-brakes.

Each dredge has one centrifugal pump and motor rated at 10 H.P. for priming the main pump.

The dipper dredge "De Lotbiniere" and the two clam-shell derricks are operated from the lines leading from No. 2 sub-station.

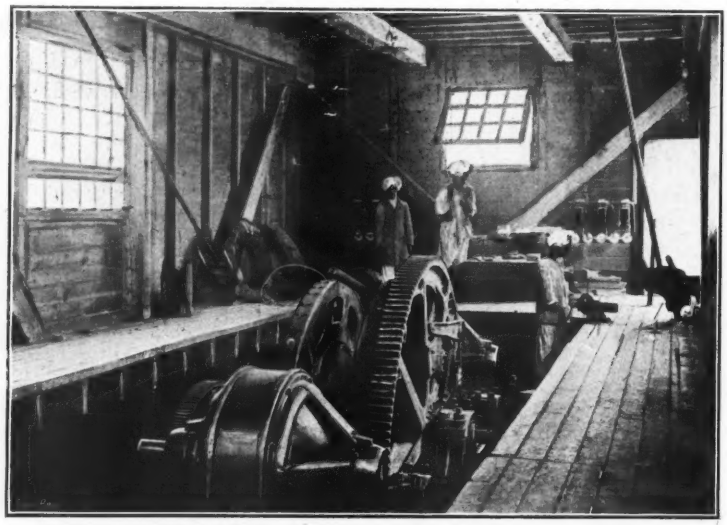
It has been said that this is the first dipper dredge ever operated by electrical power. This dredge handles a 4-yard dipper, digging loose rock at a depth of 22 ft. below water level. Under ordinary conditions, a speed of about 60 to 70 seconds per bucket-load may be maintained, digging at 22 ft. depth.

There are two main hoisting motors of 150 H.P. (500 R.P.M., 2,300-volt, three-phase). These are operated by a master controller, and also have a fixed resistance in the armature circuit, so that the last notch of the controller will cause the torque and speed to vary, giving 3,220 ft.-lb. torque at 350 R.P.M., and 1,580 ft.-lb. torque at 450 R.P.M. The permanent and variable resistance are water cooled. The permanent resistance has taps, so that it can be adjusted to suit conditions if necessary. The master controller for the two motors is made up of flat laminated brush, moving downward over two vertical rows of contacts. The motion of the handle in either direction from the central position first operates the reversing switch in one or the other direction, and secondly, sets free the brushes and allows them to fall by gravity against the action of a dashpot.

The dashpot is adjustable; the minimum time being about two seconds for cutting out the resistance.

There are five primary and six secondary contactors for the two motors. The five primary contactors are in oil and used as a single reversing switch for the two motors in parallel, but the secondary circuits of the motors are separate, each going to its own resistance.

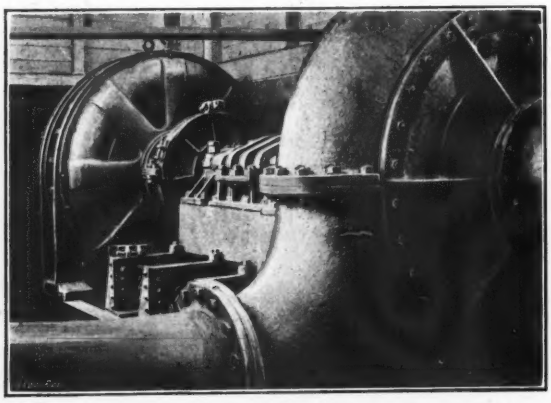
The main hoist drum (42 in. dia.) is driven by the two 150-H.P. motors mentioned above, through a clutch and two trains of gearing acting on opposite sides of the main gear.



Main Hoist, with two 150-H.P. Motors, Dipper Dredge.

The swing motor is of 100 H.P. (500 R.P.M., 2,300-volt, three-phase) operated by a controller, and also a fixed resistance in the armature circuit, so that the last notch of the controller will cause the torque and speed to vary. When the motor is running at a speed of 450 R.P.M. its armature has a kinetic energy of 50,000 ft.-lb., and the boom, dipper, dipper-handle and load have a kinetic energy of 80,000 ft.-lb.

In addition there is a load on the motor due to the rocking of the dredge when the boom swings, and this load reduced back to amature torque amounts to about 400 ft.-lb. torque. The moving parts are accelerated in about five seconds, allowed to run about six seconds, and checked in about three.



Centrifugal Pump with 350-H.P. Motor, Hydraulic Dredge.

The Srinagar Sub-station.

The rheostats for this motor are not water cooled, but consist of a permanent resistance in one section, and a controller resistance in three sections. The permanent resistance is connected between the collector rings of the motor and the controller resistance.

A 35-H.P., 750-R.P.M., 2,300-volt motor, with starting compensator for the capstan, and a 10-H.P. 220-volt motor for an air compressor, are installed in the hull of the dipper. A 1½-H.P. 220-volt motor is used for operating a blower connected by piping to both the main hoist motors,

which are of the enclosed type and receive artificial ventilation.

Each of the two clam-shell derricks has a boom 80 ft. long, and handles a three-cb.-yd. clam-shell bucket. The derrick is arranged to travel on two tracks, the boom-mast and swinging circle being supported on ten wheels running on a two-rail track, the hoisting and swinging machinery being carried on six wheels running on same track, and the second back-leg is anchored on a timber frame running on four wheels on a single rail track parallel to, and about 45 ft. from, the main track under the hoist.

The derrick hoist motor is of 100 H.P. (500 R.P.M., 2,300-volt, three-phase), and is geared to a main shaft carrying two drums, each coupled through friction clutches for operating the clam shell. On one external shaft, overhanging the winch base frame, is provided a spool, fixed to the shaft and rotating with it; a third drum, with friction-clutch and brake, is provided on a projecting stud, on which sufficient wire cable can be wound to draw the scows from the dipper dredge to a location within reach of the clam shell. The clam shell is of the smooth-edge type, without teeth, and its weight is about 7,000 lb.

The motor is operated through a controller, and also a fixed resistance in the armature circuit.

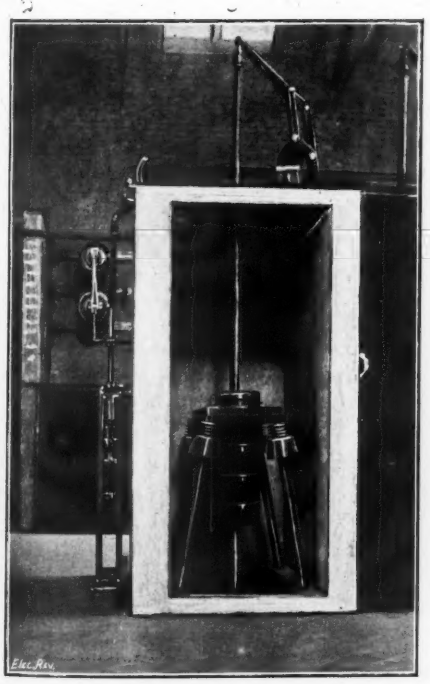
The swing motor is of 100 H.P., and of the same type and design as the swing motor on the dipper dredge. The swinging machinery consists of a drum which is connected by a wire cable, with a swinging circle 12 ft. dia., built practically all of wood.

Because of the severe strain on starting, this motor has been equipped with three permanent primary resistances, allowing approximately 300 volts drop on starting: three variable resistances and one permanent secondary resistance. The three variable secondary resistances are cut out by the controller, the one permanent resistance remaining in circuit at all times.

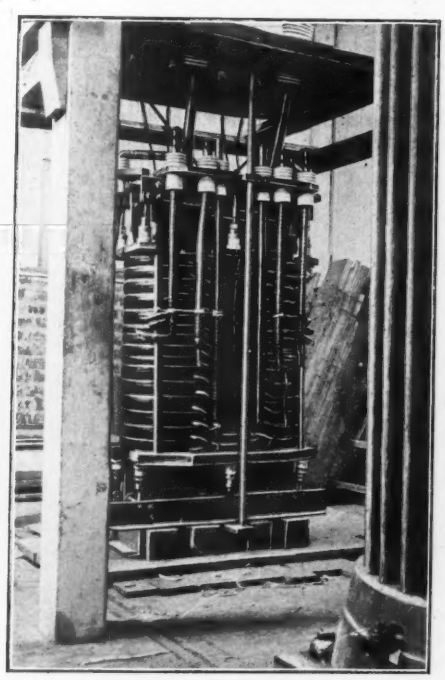
THE DREDGES DURING ERECTION.

Srinagar Sub-station and Silk Factory.—Owing to the vast quantity of wood, nearly 1,000,000 lb. weight, consumed annually by boilers in the silk factory at Srinagar, it was decided some two years ago, owing to diminishing supply of fuel in the valley, to build a sub-station on the silk-mill site and transform from steam-heating to electric heating. Before changing over to electric heating, the method was to generate steam at from 20 to 40 lb. pressure, and distribute this by means of two 3-in. galvanised-iron pipes in each building, with a small ½-in. branch and cock at each basin; the operator at each basin regulating the heat of the water by allowing more or less steam to enter the bottom of the basin through the branch pipe.

The sub-station is built of brick, and arranged to accommodate two 60,000-volt incoming lines, and two banks of transformers with a total capacity of 3,000 KW.



H.T. OIL-SWITCH CELL AT SRINAGAR SUB-STATION.



ASSEMBLING A 200-KW. 60,000-VOLT TRANSFORMER IN A SUB-STATION.

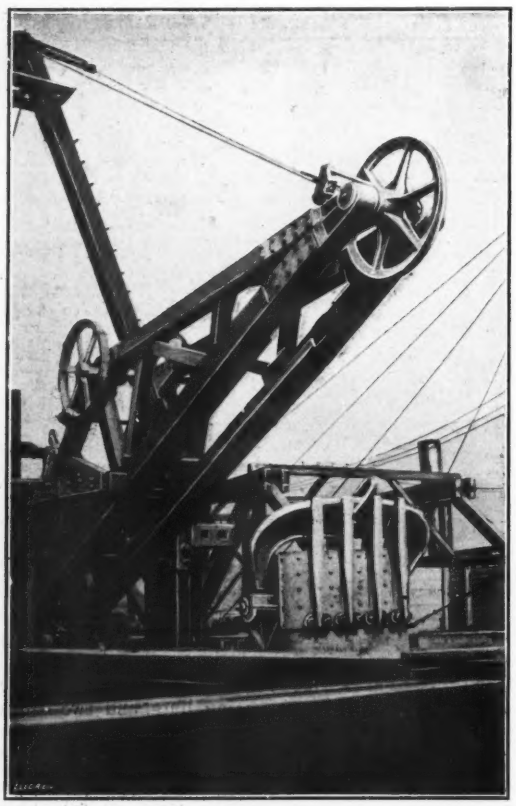
The wires enter the building through 60,000-volt wall bushings. The wire is heavily insulated with varnished cambric to a distance of 30 in. beyond the porcelain tube on either side. A test made of a bushing with bare copper wire used inside the tube, instead of varnished cambric, indicated that it is very desirable to use insulation.

The incoming lines are connected to single-pole air-break disconnecting switches, at the top side of which a connection is made for the lightning arresters. The two circuits are equipped with choke coils and continue on to a set of single-pole disconnecting switches, which are paralleled by means of an automatic oil switch equipped with primary relays and tripping mechanism. The mechanism was tested at 120,000 volts, and the wood used was tested at 100,000 volts for each 10 in. for 10 seconds. The striking distance which can be obtained on the relays is approximately 14½ in., which would give the striking distance for 150,000 volts.

In the transformer compartment there are four oil-insulated transformers, each having a rated capacity of

500 KW., arranged in one bank, with one transformer as a spare. The transformer ratios are 57,500, 28,750 to 2,300, and they are connected in "delta" on both H. and L.T. sides. Each transformer is mounted on wheels and equipped with tell-tale lamp, bell, thermostat and low-voltage relays.

The secondary leads of the transformers are connected to a



View of the Swing and Bucket of the Dipper Dredge.

triple-pole hand-operated oil switch ; in two of the leads are connected two series transformers for a reverse-current relay and ammeter.

The feeder switchboard consists of four vertical panels, with instruments, &c., a triple-pole oil switch, and three single-pole disconnecting switches for coupling the panel outfit to the bus-bars. Connected to one end of feeder panels are two station panels for manipulating induction motors operating rotary pumps and the lighting of the sub-station ; of these panels only one is in use at present.

The feeders leave the sub-station and connect with a 2,300-volt distribution surrounding the silk factory.

There are three transformer houses for the filature buildings ; each is equipped with three oil-insulated transformers, each having a rated capacity of 150 KW. The transformer ratio is 2,300 to 125, and they are connected in "delta" on the 2,300-volt side, and in "star" on the low-tension side with the neutral earthed, giving a potential of 220 volts between phases.

The system of distribution is three-phase four-wire, with neutral earthed at the transformer star connection. Earthing the neutral outside the transformer houses has been avoided as far as possible, as all kinds of disturbances are liable to occur.

At the present time there have been installed 1,000 heaters. These heaters are furnished with lead pipes 36 in. long, and German silver leads insulated with glass beads over their entire length, the ends projecting 6 in. beyond the end of the pipe. The rated capacity of 664 is 1,000 watts each, and 336 are rated at 800 watts each. The 1,000-watt heaters are for spinning basins, and the 800-watt, for cooking basins. They have been figured to raise one gallon of water from 60° to boiling point in 30 minutes, using 1,000 and 800 watts respectively. The heater is coated with a casing of copper, the insulation between the outer case and the resistance wire is composed of mica, and it is essential that the casing should be water-tight in order to protect the insulation of the resistance, and also to protect the resistance wire from corrosion. Tests were made at the silk factory to determine the amount of power taken to operate the spinning and cooking basins under various conditions and to see if this power could be decreased in any way.

In addition to heaters there are 12 5-H.P. three-phase slip-ring motors with resistances capable of reducing the speed from 700 R.P.M. to 350 R.P.M., with intermittent speeds.

The chief credit for the origin and completion of the Jhelum power installation is due to Major A. J. de Lotbiniere, R.E., C.I.E., who not only conceived the plan to stop disastrous flooding of Srinagar by a unique method of dredging, but successfully arranged for the preservation of fast diminishing timber lands, by harnessing the Jhelum River. The entire hydro-electric installation has been personally supervised by Major de Lotbiniere, who is better known as chief engineer and financier of the Cauvery power scheme. Much credit is also due to Capt. J. C. Hunter, who for a number of years has been the right hand man of Major de Lotbiniere in not only the Jhelum power installation, but the successful Mysore scheme.

Canadian Pacific Electrification.—It is announced that the Canadian Pacific Railway has decided to electrify its system through the mountains of the West. Plans were begun a year ago, when experts were sent to examine the mountain streams and the available water supply between the eastern Rockies and the Pacific Coast range. They reported that there were enough waterfalls immediately adjacent to the Canadian Pacific's main line to "develop energy sufficient to run all the railways in the world." Many water sites have been purchased, and throughout British Columbia options on others have been obtained. The advances made by the Canadian Northern and the Grand Trunk lines in the West are said to have been responsible for this action by the Canadian Pacific.—*Electrical World.*

Electricity and Cancer.—In an article in *Archives of the Roentgen Ray*, by Dr. G. B. Massey, of Philadelphia, the author states that he has found it possible, by the use of zinc needles coated with mercury and thrust into a malignant growth, to introduce zinc and mercury ions in a few minutes, sufficient to kill all malignant germs. Strong electric currents are employed to introduce these ions, by means of the electrolytic and cataphoretic action of the positive pole. The operation is conducted under an anæsthetic, and is not followed by pain; in a short time the growth dies and separates from the healthy tissue, which quickly heals. In the majority of cases beneficial results follow, and sometimes complete cures.

The Clam-Shell Derricks Nearly Completed.

Ambulance Competition.—The Electrical Department of the London and North-Western Railway provided the winning team in the annual ambulance competition on Wednesday, last week, at Crewe, when 19 teams competed. They will thus take part in the great railway ambulance contest in Manchester.

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INQUIRY COLUMN.

[Replies should be accompanied by stamped envelopes ready for retransmission to our correspondents.]

"Carbon" asks whether there is such a thing on the market as Compressed Carbon or Carbon Briquettes; if so, who makes them?

The names of makers of Kama Electric Projecting Lamps, and of Invar Wire, are asked for.

NOTES.

A Natal Hydro-Electric Scheme. — The scheme for harnessing the Howick Falls of the Umgeni, in Natal, and utilising them for the supply of electricity for driving a woollen factory which it is proposed to establish there, will be carried out by a small syndicate—the Howick Falls Development Syndicate—the capital for which has been subscribed by the residents of the district. Mr. John Bell is chairman, Mr. Charles Legward the consulting engineer, and Mr. Munro Miller, secretary. It is proposed to put down five Pelton wheels, 4 ft. in dia., driving electric generators. The head is 365 ft. There will be two single Pelton wheels

Howick Falls.

with three nozzles, developing 450 H.P. each; two 600-KW. sets driven by 4-ft. Pelton wheels, with five nozzles, developing 900 H.P. each; and one single 1,200 KW. set, driven by a double Pelton wheel 4 ft. in dia., with ten nozzles, five to each section of the wheel, developing 1,800 H.P., a nominal total of 4,500 H.P. The cost of the work is estimated at between £20,000 and £25,000. In return for the concession to use the Falls, the syndicate will light the village free of charge, but an income is anticipated from private supply to residents, millowners, and so on, while a supply to Maritzburg, which is 10 or 12 miles away, is talked of. It is further thought that other industries, such as paper-making, tanneries, &c., may be attracted to the neighbourhood by the availability of cheap power.

Electric Railways in Germany.—The subject of the introduction of electric traction on Prussian railways was discussed at some length at the recent sitting of the Budget Commission of the Prussian Diet, and from the reply given by the Minister of Railways, it is obvious that any such schemes are in a less advanced stage than has been represented in certain quarters during the past two or three years. In the first place, the Minister expressed doubts as to the great progress alleged during the debate to have been made in other countries, and he pointed out that main line working in the lands concerned was also in the stage of experiment. He was friendly disposed towards the adoption of the system on main lines, but from the nature of the matter there were still too many difficulties to overcome for them to be able to introduce the method on the State railways. It was proposed to construct a larger experimental section, and it was hoped that the necessary funds could still be sanctioned this year. As far as concerned the conversion of the Berlin city railway, the Minister referred to the inadequate yield afforded by it, and stated that although the transformation would result in greater capacity, the work would necessitate such a large cost of installation that the existing extraordinarily low fares could no longer be maintained. The results of electrical working on the two State railway sections in Berlin and Hamburg could be regarded as favourable, and the system was preferred by the public for the suburban traffic in Berlin. Difficulties in working had been encountered at the beginning in Hamburg, but they had been surmounted, and the traffic had increased in a quite unusual manner. The Railway Administration, in connection with further trials, would hold in prospect electrical working on main lines having a heavy traffic, but the use of storage battery cars was considered more appropriate for secondary lines and those having a less density of traffic.

The principle of State ownership, the Minister proceeded to remark, would be adhered to in connection with the sanctioning of new main line electric railways on the application of private companies, and as a consequence no projects would be authorised which were capable of interrupting the large through traffic or of materially influencing the traffic on the main lines of the State. It was impossible to set up a general principle for the approval of such proposals, as they must be judged case by case. The railway from Cologne to Bonn, along the bank of the Rhine, had diverted a portion of the traffic on the State railway in the same district, but that represented a certain relief to the State railway, as it would soon no longer have been able with the existing means to cope with the constantly increasing traffic. The Minister assumed a very cautious attitude in regard to the scheme for the establishment of a private railway between Dortmund and Dusseldorf, as it would form a competitor of the State railway. The project for a high-speed line between Cologne and Dusseldorf would have to be considered in connection with the question whether the State should lay third and fourth tracks, and thus meet the requirements, or whether the former had an importance to which preference could be given. It was hoped to give a decision very shortly in respect of the application for a concession for this particular line. The State was prepared under certain conditions to grant a concession for an electric main line between Frankfort-on-the-Main and Wiesbaden, and was ready to promote the interests of the scheme. In conclusion, the Minister admitted the necessity of giving consideration to the electrical industry, and as far as possible assisting it over the present difficult situation by the provision of new opportunities of work.

It is apparent from the statements of the Minister of Railways that the idea of any substantial development of electric railways in Prussia in the near future is out of the question, and that existing State ownership, combined with financial considerations, represents the principal obstacle in the way of progress. The observations in regard to the Berlin City railways also dispose of any immediate prospect of the lines being converted to electric traction, whilst the faith manifested in accumulator cars, which are now being introduced to the number of nearly 100 on a variety of different local railways, is remarkable. It must, of course, not be left out of consideration that military matters, about which the Minister does not seem to have made any statement, also play an important part in connection with any schemes for the transformation of existing railways to electric traction, or the construction of new lines in any part of the country. The latter point applies equally to the other Federal States in the Empire, although Bavaria is said to be desirous of making progress by the utilisation of water power for the purpose.

Parliamentary. — Telegraphic Facilities. — In Friday's Parliamentary paper, Mr. Cathcart Wason asks the Postmaster-General what were the result of his inquiries with reference to telegraphic communication to North Ronaldshay. Mr. Sydney Buxton states that a cable across Ronaldshay Firth to North Ronaldshay would be in a strong tideway and over a rocky bottom, and the expense of maintaining it would be prohibitive. A wireless installation might be practicable, and experiments are now being made to ascertain the cost.

Standing Orders.—The Examiner has found that Standing Orders have not been complied with in the case of the London County Council Tramways Bill and the Torquay and Paignton Tramways Bill. In each case the non-compliance was in respect of consents by local authorities. The Bills will now go before the Standing Order Committee, who will decide whether they shall be allowed to proceed.

London Electric Supply. — On March 4th Mr. Churchill brought in his Bill to constitute the L.C.C. the purchasing authority in respect of the undertakings of certain electric lighting companies in London, to which the London Electric Supply Act, 1908, does not apply. See Elec. Rev., February 12th.

Foreign Government Contracts.—In a return just issued of all the contracts made by the Government Department for foreign manufactured articles for the year ending March 31st last, the total value of the goods obtained is given at £408,577. Amongst the articles so obtained were the following:—*Admiralty*—Carbons for arc lamps, £363; carbon brushes £280, cells £1,423, electric grinders £2,600, radio-telegraphic apparatus £1,500. *War Office*—Aluminium £297, electric light carbons £3, copper ingot £82,877, telephones £1,360. *Post Office*—Telephonic apparatus £41,817, telegraphic apparatus of various sorts £463, fire alarm apparatus

(Gamewell system) £3,391, electric light apparatus and fittings £368, carbons £664, secondary cell apparatus £53, motors and parts £28, bimetallic wire £96, eburine insulators £82, electric waxpots £22 *Works (England)*—Telephone clocks £170. *Works (Ireland)*—Osram and other metallic-filament lamps £20.

In the House of Lords on March 3rd, the Anglo-Argentine Tramway Co.'s Bill was read a second time.

In the House of Commons on March 8th, the Folkestone, Sandgate and Hythe Tramways Bill was read a second time.

Appointments Vacant.—Resident electrical engineer (£300, rising to £400), chief electrical assistant (£150, rising to £200), also junior electrical assistant (30s) for Tunbridge Wells Corporation electrical undertaking. Assistant clerk for Shanghai municipal electricity department (£23 per month). See our advertisement pages for fuller particulars.

Standard Specifications for Coal.—Our readers will be interested to hear that a committee of the American Society for Testing Materials held a meeting on January 29th, at which the opinion was expressed generally that it would be quite feasible to sell coal on heat value specifications. A sub committee which had been appointed to classify the users of coal who could properly purchase under specification, suggested the following classification:—(1) Steam plants; stationary power, locos., marine, &c.; (2) producer gas; (3) domestic; low-pressure heating plants, anthracite, bituminous, and coke; (4) metallurgical; coke, smithing; (5) gas (illuminating); (6) cement and miscellaneous. Sub-committees were appointed to draw up specifications for each of these heads, and will report in June next. We hope that the *Electric Railway Journal*, from which we have condensed this information, will report fully the society's work as it becomes known, as there is considerable doubt in this country as to the practicability of buying heat units instead of coal, although there is no doubt whatever that every large user would welcome such a scheme if it could be proved workable in practice.

The Scope of a German Electrical Bank.—The electrical bank projected by the Felten & Guilleaume-Lahmeyer Works Co., the formal constitution of which was recently announced, has now been established under the title of the Treuhandbank fur die Elektrische Industrie, Actien-Gesellschaft of Berlin, the share capital being £1,250,000, divided into 25,000 registered shares. The object of the undertaking is stated to be (1) the granting of loans for the establishment, extension or improvement of electrical installations of every kind; (2) the acquisition of or investment in debts which have arisen from the construction, extension or improvement of installations. The debtors in the case of debts to be acquired or money advanced are to be (*a*) the German Empire, German Federal States, town or communal associations, or public corporations whose bonds are considered safe security in a Federal State; and (*b*) other "physical or legal persons" having a guarantee according to the third clause of the company's statutes. This security can be offered by the pledging of ground values, including mines, mortgages, debts relating to ground values and shares. The issue of obligations by the company on the basis of debts to the persons noted under (*b*) is not to exceed at any time five times the amount of the paid capital, and the total emission of bonds must not be greater than three times the nominal capital. It is further provided that cash funds not requisite for transactions of the above kind may be employed for the purchase of or investment in first-class discounts, the purchase of Imperial or Federal State bonds, or of the large cities and for the advance of money on the deposit of State or city loan securities.

Restaurant Lighting.—Blanchard's Restaurant has an up-to-date lighting installation with tantalum lamps fitted throughout. At an inaugural luncheon held there on Wednesday, there were present Messrs. T. C. Bryce, S. Green and C. Thorpe, all representing the St. James' and Pall Mall Electric Light Co, and Mr. E. P. Barfield, of Siemens Bros. Dynamo Works, Ltd.

Annual Dinners.—The P. & O. Batti Wallahs.—The fourth annual dinner of this active and thriving society was held in the Queen's Salon at the Holborn, on Saturday, the 6th inst., the president, Mr. C. L. Lichtenberg, being in the chair. As usual, a certain amount of joy was obtained from Mr. Punching, and there was some really excellent conjuring by Mr. Charles Bulwar. The strenuous labours of the hon. secretary, Mr. J. F. Avila, were recognised by an interpolation in the programme in the shape of a presentation to him of a silver casket, suitably engraved, as a token of gratitude. Music was performed by the Concordia Quartette, and songs by Miss Dora Gilbert and Miss Moyle, and altogether the evening was a very pleasant one. The Batti Wallahs brought their ladies with them. An amusing turn was the performance of Mr. E. Lilt on a variety of novel instruments—"Men of Harlech" played on a suspended row of broken jam pots, "Annie Laurie" on a walking stick, and "Robin Adair" on a xylophone, which is, of course, Greek for a contraption of wood!

The staff and employés of the Bolton Corporation electricity works held their second annual dinner on Wednesday last week. The company included the chairman of the Electricity Committee (Alderman J. Berry, J.P.), the borough electrical engineer (Mr. A. A. Day), Mr. R. S. Hornby (chief assistant engineer), and Mr. W. J. Wood (station superintendent). Alderman Berry, in submitting "The Bolton Corporation Electricity Works," referred to the good feeling between the staff and the workers, and said that all the machines were modern, and the station was as well equipped as any in the kingdom. Although the works were still progressing, he thought the output this year would be less than last, owing, to a large extent, to the cotton strike, and to trade depression generally. Mr. Day, in responding, commented on Mr. Berry's remarks *re* producing current as cheap as anybody in Europe; he said that he would go a little further, and say that they produced as cheaply as anybody in the world, a fact mentioned in the presidential address of the Institution of Electrical Engineers last year, and he took it that that had some foundation. The L.G.B. Inspector had that morning said that they were in a very sound financial condition. Mr. W. J. Wood proposed "Our Chief," and Mr. Day suitably acknowledged the toast. Mr. H. E. Annett proposed "The Visitors," and Mr. J. Crompton responded.

Institution and Lecture Notes.—Junior Institution of Engineers.—At the last meeting of this Institution, a paper was read by Mr. K. Gray on "Heat Transmission in Buildings" A paper entitled "Heating and Ventilation" was submitted by Mr. J. Jeffreys.

Manchester Municipal School of Technology Engineering Society.—A public lecture on the Diesel oil engine was delivered by Mr. Charles Day, M.I.Mech.E., on Monday evening last. The ground covered was as follows:—Explanation of the term "internal combustion engine"; brief description of the "Otto" cycle; the "Diesel" cycle; compression to high pressures; special features of Diesel engines; points of construction; method of starting; fuel consumption and thermal efficiency; cost of fuel; conditions for which Diesel engines are specially applicable; application to marine propulsion.

Institution of Municipal Engineers.—At the general meeting on April 24th a paper will be read on "The Design and Requirements of Electrical Power Houses," by Horace L. P. Boot, M.I.E.E.

Bristol Association of Engineers.—At Clifton last week a paper was read by Mr. H. H. Couzens (deputy city electrical engineer) on "Some Recent Developments in Connection with Electrical Power Transmission in Bristol."

Institution of Electrical Engineers (Dublin Section).—Yesterday a meeting was to be held, at which a paper by Mr. R. G. Allen on "Testing the Insulation Resistance of Live Cables" was down for reading.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the Electrical Review *posted as to their movements.*

Central Station Officials.—Tunbridge Wells Town Council has passed a report from the Electricity Committee recommending the termination of the present engagements of Mr. H. L. P. Boot, the consulting electrical engineer, on June 30th; of Mr. David Smith, resident electrical engineer, on May 31st; and of Mr. M. H. Curry, assistant in the electrical department, on April 30th. A resident engineer is to be advertised for at a salary of £300 per annum, rising by £25 a year to £400, and a chief assistant at a salary of £150, rising by £12 10s. a year to £200.

Mr. Foster, the electrical engineer of the Epsom undertaking, has resigned his post, the resignation to take effect on August 15th. The Council is to grant him a suitable testimonial.

The Burnley Corporation electricity works staff and employés, on March 4th, held a smoker in honour of Mr. John R. Walton, who is leaving to take up an appointment in South Shields. Mr. Walton, who has been on the Burnley staff for nine years, was presented with a portmanteau and a non-magnetic lever watch.

Erith U.D.C. has appointed Mr. H. E. Midgley, chief assistant electrical engineer, as deputy electrical engineer, and Mr. E. Saynor, junior engineer, as charge engineer.

The Wrexham electricity staff have presented a set of carvers to Mr. E. Edwards, who is leaving to become station superintendent at Partick, Glasgow.

Mr E. A. Faver, of Shepherd's Bush, has been appointed by the Hammersmith Electricity Committee to the position of fourth engineer-in-charge, which was recently resigned by Mr. W. A. Kitchen. There were 226 applications.

After serving under the War Department for five years as Electrician-in-Charge at the Royal Victoria Hospital, Netley, Mr. Arthur Preston has been appointed engineer to the Ammanford (S. Wales) Electric Supply.

At a meeting of the Rochdale T.C. held on Thursday last week, the recommendation of the Gas and Electricity Committees that the salary of Mr. C. C. Atchison (borough electrical engineer) be increased from £350 to £400 per annum, was referred back after a spirited discussion.

At the monthly meeting of the Belfast City Council, a recommendation of the Tramways and Electricity Committee to increase the salary of Mr. T. W. Bloxam, city electrical engineer, by £50 per annum, was confirmed.

General.—Mr. C. S. May completed a five years' agreement with Messrs. Burn & Co., Calcutta, as chief electrical engineer, on February 15th, and on the eve of his departure, his native staff presented him with an address and silver casket of Indian design and manufacture, and a framed photograph of himself and staff. His European assistants presented him with a silver watch suitably engraved. The presentation was made in

the spacious offices of the firm, in the presence of a large number of European and Indian gentlemen. We understand that Mr. May intends to return to London and engage in export work. His address until further notice will be "Stisted, Braintree, Essex," where anyone desiring to communicate with him concerning business with India should address him.

On March 4th at Irton Parish Church, Mr. George Westinghouse, Jun., was married to Miss Evelyn Brocklebank, daughter of Sir Thomas Brocklebank, of Irton Hall, Cumberland.

On March 2nd, Mr. R. S. Pilcher, manager of the Aberdeen Corporation Tramways, was presented by the members of the Tramways Committee, with a silver fruit and flower centre-piece on the occasion of his marriage.

Mr. J. Sutherland Warner left on Saturday, the 6th inst., in the *Mauretania* on a visit to the United States.

Obituary.—The death has occurred of Mr. Wm. Holt, manufacturing electrician, of Snargate Street, Dover. He was 78 years of age, and is described as one of the pioneers of the E.L. at Dover.

CITY NOTES.

County of Durham Electrical Power Distribution Co., Ltd.

The directors' report for 1908 says that the profits, together with the balance of £383 brought forward from 1907, amounted to £24,607. Interest on loans and debenture stock absorbed £11,706 of this. An interim dividend on the preference shares at the rate of 5 per cent. per annum was paid in October last, amounting to £6,250, leaving a balance of £6,651. In view of the circumstances referred to hereafter, the directors have decided to appropriate this balance as follows:—In transferring to depreciation and reserve account £6,500, carrying forward £151. The trade depression which prevailed in the engineering and shipbuilding industries during last year, and which was augmented by labour disputes and strikes, has of necessity adversely affected the profits of the year; the working costs have also been seriously affected by the continued high price of coal. In view of the reduction of profits caused thereby, the directors have deemed it prudent to pay no further dividends for the year, but rather to strengthen the position of the company by adding to the depreciation and reserve account. Since the close of the year the revenue shows an increase over that of the corresponding period of last year, and the price of coal has now fallen to its former level. During the year the whole of the company's substations, plant and mains has been maintained in a high state of efficiency out of revenue. The total connections to the company's system at the end of the year, including the connections of its associated Parliamentary company—the County of Durham Electric Power Supply Co.—amount to 29,336 H.P., which, compared with the previous year's figure of 20,757 H.P., shows an increase of 8,579 H.P. The main power transmission system of the company is complete, with the exception of the necessary cables for connecting the company's system with the new power station at Dunston, now in course of erection by the Newcastle-upon-Tyne Electric Supply Co., Ltd., from which station the supply for a large portion of the company's future load will be obtained. The tunnel under the Tyne, by which current will be delivered direct from the Newcastle company's station at Carville to this company's area, has now been completed, and will be of material benefit to the company. The expenditure on capital extensions during the year has been £94,060, of which £44,045 represents the outlay on the company's account, and £50,014 the outlay on behalf of the Parliamentary company, for which this company receives shares. The balance of the first mortgage debenture stock was paid up early in the year, making the whole of the authorised issue of £250,000 stock fully paid up.

Hastings and District Electric Tramways Co., Ltd.

In their report for the year 1908, the directors regret the delay that has occurred in its issue, due to negotiations with the Corporation, which are still pending, upon the subject of the revision of fares. A decision has not yet been arrived at, but the directors have decided not to wait any longer before presenting the accounts. The revenue account of the Hastings Tramways Co. shows a credit balance of £19,775, which has been handed over by way of dividend on its shares, which are all owned by this company. The traffic receipts show a decrease of £1,585, as compared with last year, which may be ascribed to the depressed conditions generally prevailing throughout the year, from which Hastings has suffered in common with every other seaside resort. On the other hand, working expenses show an increase of £2,562, almost entirely under the head of maintenance and repairs. This is due mainly to the upkeep of the Dolter system on the Front line, for which the Dolter Co. were previously responsible under their guarantee. The revenue account shows receipts aggregating £19,767, or, after deducting administration expenses, £17,667, and adding £1,767 brought forward, making a total of £19,434. From this must be deducted £9,815 for debenture interest, and £1,202 for interest on bankers' loan and contractors' outstanding accounts; leaving an available balance of £8,417. The directors propose to deal with this sum by the transfer of £4,000 to depreciation account, and to pay 2 per cent. per annum, amounting to £4,000, on the preference shares, being the arrears referred to in the balance-sheet for the year 1906. The preference dividend for the year 1907 having been paid in full, this will leave the whole of the dividend for 1908 in arrear. The balance of £417 is carried forward.

W. T. Glover & Co., Ltd.

The directors' report for 1908, which is to be presented at the meeting next Monday, shows that the result of the trading is a credit balance of £31,413, plus £5,576 brought forward. From this there are deducted:—Directors' remuneration, voted March, 1908, £1,000; directors' expenses during 1908, £55; interest (at 4½ per cent.) on first mortgage debenture stock, £4,250; interest (at 5 per cent.) on second mortgage debenture stock, £3,916 = £9,221, and appropriation for payment to trustees of second mortgage debenture stock £4,000, leaving £23,768. Out of this is paid a dividend on 5 per cent. cumulative preference shares (£100,000), less income-tax, requiring £4,750, transferred to first mortgage debenture redemption fund £2,500, and a dividend on ordinary shares (£114,850) at the rate of 5 per cent. per annum, less income-tax, requiring £5,455, leaving to be carried forward to next year £11,063. The directors report a continued improvement in the financial position of the company, and recommend the payment of the dividend on the 5 per cent. cumulative preference shares for the year ending December 31st, 1908, and also the payment of a dividend on the ordinary shares at the rate of 5 per cent. per annum for the same period. The cable industry is sharing the general depression of trade experienced throughout the country. The revision of the articles of association of the company, previously alluded to, has been deferred for the present, in order to bring them into line with the most recent legislation. They will be submitted for confirmation in due course.

Carlisle Electric Tramways Co.—The annual meeting was held at Carlisle on 8th inst. Mr. Lingard presided, and in moving the adoption of the report he said that the net result of the year's working was that they had made £1,437, and had £1,600 to pay on debentures. That showed a deficiency of £163. It was a very bad report, and a very serious state of things, but it was not so bad as it looked on the face of it. The concern had existed for nine or ten years, and machinery, permanent way, and equipment would not last for ever. During the past year they had been obliged to spend £700 to £800 on repairs, which was £222 more than in the previous year, and that made a great difference. The present state of affairs had caused the directors great thought, work and trouble, and they had had a scheme laid before them lately, which appeared on the surface to be good. In fact, it appeared almost too good to be true, but if it turned out that the figures before them had been approximately correct, and they were able to adopt the scheme, they would be able to show a very different result in the working of the company. The matter was full of difficulties, and he could not speak more definitely, and it might be that they would have to call the shareholders together to discuss the matter later. After discussion the report was adopted.

Canadian General Electric Co., Ltd.—A dividend of 1¾ per cent. on the Common stock for the three months to the 31st inst., being at the rate of 7 per cent. per annum, is announced.

Gateshead and District Tramways Co., Ltd.—The directors recommend a dividend on the ordinary shares at the rate of 7 per cent. per annum for 1908. For 1907 the rate was the same.

Liverpool Rubber Co.—Dividends of 5 per cent. on the non-cumulative preference shares and 2 per cent. on the ordinary shares are recommended.

Mackay Companies.—Quarterly dividends of 1 per cent. on the preferred and common shares have been declared.

Stock Exchange Notices.—Applications have been made to the Committee to appoint a special settling day in and to grant a quotation to:—

Anglo-Argentine Tramways Co., Ltd.—Scrip, fully and partly paid, for a further issue of £1,354,319 4 per cent. debenture stock, and a further issue of £2,133,125 4 per cent. debenture stock (bearing interest from February 1st, 1909).

And to allow the following securities to be quoted in the Official List:—

Anglo-Argentine Tramways Co., Ltd.—Further issue of £418,290 4 per cent. debenture stock, in lieu of the permanent 6 per cent. debenture stock now quoted.

National Telephone Co., Ltd.—Further issue of £267,000 4 per cent. debenture stock.

British Insulated and Helsby Cables, Ltd.—The directors recommend a final dividend of 6s. per share, making 10s. per share for the year. The total distribution for 1907 was at the same rate.

South Metropolitan Electric Light and Power Co., Ltd.—The 4½ per cent. 1st mortgage debenture stock register and register of transfers will be closed from March 18th to 31st, 1909 (both days inclusive).

Krieger Electric Carriage Syndicate, Ltd. and Reduced.—A petition for the reduction of capital from £100,000 to £72,250 is to be heard in the Chancery Division on March 20th.

Brompton and Kensington Electricity Supply Co., Ltd.

The directors' report for the year ended December 31st, 1908, states that the revenue account shows a credit balance of £27,795, which, with the balance of £10,136 brought forward, and £450 balance of interest received and accrued, makes a total of £38,381; 7 per cent. is paid on the preference, and 10 per cent. on the ordinary shares for the year, £8,000 has been placed to depreciation account, and £2,000 to reserve fund account. Directors' additional remuneration accounts for a further £424, and there is carried forward £9,400. The following table shows the progress of the company's business:—

Year.	8-c.p. lamps connected.	Inc. in 35-watt (8-c.p.) lamps.	Customers connected.	Gross receipts. £	Expenditure. £	Net receipts. £	Aver. price per unit. d.	Div. on ord. shares.
1905	188,836	18,717	3,861	51,149	21,209	29,940	4·43	10%
1906	202,756	14,170	4,127	53,118	21,735	31,383	4·34	10%
1907	213,916	11,160	4,362	55,634	23,916	31,718	4·22	10%
1908	224,826	10,910	4,593	53,133	25,318	27,795	4·17	10%

The Bill, approved by the shareholders at the last general meeting, for conferring upon the London electric supply companies further powers for the better supply of electrical energy in the metropolis was sanctioned by Parliament, with certain modifications, and has since received the Royal assent, and the Bill of the London and District Electricity Supply Co. seeking competitive powers was finally rejected. This result, though involving very considerable expense, is to be regarded as satisfactory.

German South American Telegraph Co.

The first report of the directors of the Deutsch-Sudamerikanische Telegraphen Gesellschaft, of Cologne, states that the company was formed on August 27th, 1908, for the purpose, in the first place, of establishing and working a cable connection between Borkum, *vid* Santa Cruz de Teneriffe to Brazil. The negotiations as to whether the cable shall be laid direct from Santa Cruz de Teneriffe to Pernambuco, or *vid* Monrovia, are still proceeding. It is proposed later on to extend the cable from Teneriffe or Monrovia to the German Colonies on the West Coast of Africa, so as to connect Togo, the Cameroons and German South-West Africa. The share capital for the first section from Borkum to Teneriffe amounts to £200,000, apart from a loan of £390,000, whilst the capital required for the remaining sections will be provided by an increase in the ordinary shares and a further emission of bonds. The requisite concessions for the landing of the cables were originally acquired by the Felten & Guilleaume-Lahmeyer Works Co., and were transferred to the South American Telegraph Co. An obligation has been entered into by the German Government to pay subsidies for the various sections for a period of 40 years, but 75 per cent. of the cable receipts during this term will be reckoned on account of the subsidies. The payment of interest and redemption of the loan of £390,000 has been guaranteed by an agreement concluded between the German Imperial Post Office and the company.

The work of construction and laying of the cable to Brazil has been entrusted to the North German Sea Cable Works Co., of Nordenheim, which has undertaken to take over on account of the contract the 4½ per cent. bonds to be issued by the company on conditions arranged for, whilst the balance will be paid in cash. The speed of transmission with the recorder system is to amount to a minimum of 24 to 25 words per minute, each word being reckoned as composed of five letters, and in this way the cables will be assured of being able to deal with the traffic that is expected. At the end of 1908, 710 nautical miles of the Borkum-Teneriffe cable were completed, and the work of laying to Teneriffe will presumably be finished in July. The working of the cable from Germany will be undertaken by the Imperial Telegraph Administration from Emden, and the necessary cable connection between Emden and Borkum has already been effected by the Administration.

County of London Electric Supply Co., Ltd.

The directors report that the capital expended during the last year on account of the company's London districts amounted to £82,222, and of this, £7,067 has been deducted in respect of machinery displaced. The net total expenditure in respect of those districts up to December 31st last amounted to £1,646,932. There is a balance from last account of £4,381, and the balance from the current revenue account, after deducting generation and distribution costs, rents, rates, taxes, wages, directors' fees, general establishment and other charges, and proportion of salaries is £101,037, making a total available revenue for the year 1908 of £105,419. Interest on the first and second debenture stock and interest on temporary loans to December 31st, 1908, less income-tax, requires £39,512, interim dividend on 40,000 6 per cent. preference shares for half-year ended June 30th, 1908, and on further issue of 10,026 6 per cent. preference shares from due date of calls to June 30th, 1908, less income-tax, £13,004; interim dividend on 40,000 ordinary shares at 4 per cent. per annum for half-year ended June 30th, 1908, less income-tax, £7,600; amount carried to reserve for depreciation, repairs, renewals, &c., £16,000; leaving for further distribution £29,303. The directors now recommend that a further dividend on 5,026 6 per cent fully-paid preference shares for the half-year ended December 31st, 1908, less income-tax, be declared; and a further dividend on 40,000 ordinary shares for the half-year ended December 31st, 1908, at the rate of 6 per cent. per annum, less income-tax. These payments will absorb £25,657, leaving a balance of £3,645 to be carried forward. The profits derived from the company's London stations for 1908 amounted to £115,095. The total applications received at December 31st last amounted to the equivalent of 1,085,192—30-watt lamps (32,556 kw.), being an increase of 84,021 lamps (2,521 kw) for the year. The total units sold were 13,610,760, as against 13,970,179 for the previous year. Excluding the consumption taken by the L.C.C. Tramways in 1907, the units sold during 1908 show an increase of 11 per cent. Of the 15,000 preference shares issued in December, 1907, a further 2,142 shares have been allotted since the close of the year, making 12,168 shares allotted to date in respect of that issue. The directors of the Bournemouth Co. have recommended a final dividend on the ordinary shares at the rate of 7 per cent. per annum, making 6 per cent. for the year. The Coatbridge and Airdrie Electric Supply Co., Ltd., continues to show satisfactory progress, 1,639,208 units having been sold during the year, against 1,055,557 units for the previous year. The directors congratulate the shareholders upon the success of the efforts made by the company in conjunction with seven other London companies in the last session of Parliament.

These efforts resulted in the defeat of the London and District Electricity Supply Bill, which sought to obtain competitive powers in London, and the passing of the London Electric Supply Act, extending the powers of the existing authorised undertakers. The latter confers the following, amongst other extended powers, upon this company:—(*a*) Combination and association for the purpose of giving and taking a supply of electric energy; (*b*) Right to lay inter-connecting mains between separate generating stations and areas; (*c*) Joint management of generating stations or parts of undertakings.

The Act also confers upon other authorised undertakers similar powers to those already obtained by this company with respect to supplying electrical energy to railway companies, &c. The additional powers above referred to, while ensuring greater security to the public, should enable this company to effect economies in future working costs and capital expenditure. The powers are of special value to this company, possessing as it does two generating stations suitable for inter-connecting, and such an extensive area of supply, which places the company in a favourable position for giving a bulk supply to other supply undertakings. Not only will the additional powers conferred be of material benefit to the future working of the company and the interests of its consumers, but the successful results obtained by the companies in the last session of Parliament will ensure freedom from the harassing influences of Parliamentary legislation, and relief from the burden of further expenditure in defending your interests. The following is a statement of electricity generated, sold, &c:—

Quantity generated in B. of T. units	18,134,216
Sold to private consumers by meter	13,610,760
Used on works	1,175,980
Total quantity accounted for	14,786,690
Quantity not accounted for	3,347,526
Total maximum supply demanded, kw.	9,100

Northampton Electric Light and Power Co., Ltd.

The directors report that the year 1908 shows better results than any similar period since the incorporation of the company. Lamps have been added to the number of 3,499, and motors (reckoned as 8-c.p. lamps) 7,980, together 11,479; the horse-power of motors has increased from 737 to 1,003, and of this 793 h.p. are being hired from the company. The net increase of consumers is 73. The growing use of current for manufacturing purposes is quite an important feature in the year's working. It may be added that nearly all the lamps of the older type have now been displaced by the metallic-filament lamps, to the great advantage of the consumer in point of efficiency and economy. The mains have been extended in various directions, making the total mileage 21 miles 664 yards. The output of units has been 1,075,426, being an increase of 28 per cent. Maximum load on plant, 891 kw. (19 per cent. increase). Load factor 13·7. Some special repairs have been undertaken, occasioning an increase of expenditure under this head; the chimney shaft in particular having been thoroughly overhauled and placed in complete repair; but in all other respects the working cost per unit of current generated is less than in the preceding year. It was found possible to carry on the work without additional share capital, but extensions of plant will be necessary during the present year in order to meet the largely increasing demands, and further shares will be offered for subscription. It is proposed to add £2,000 to the depreciation account, to write £200 off motors, and to commence the formation of a reserve fund with a sum of £500, leaving an available balance of £1,870. The half-year's dividend on the 5 per cent. preference shares will amount to £626, and it is proposed to pay 5½ per cent. per annum on the ordinary shares (making 5 per cent. for the year), £1,007, carrying forward £238.

Yorkshire (West Riding) Electric Tramways Co., Ltd.

The fourth ordinary general meeting of this company was held on Friday at 35, Parliament Street, Mr. Herbert S. Leon presiding.

The Chairman, in moving the adoption of the report (see Electrical Review, February 19th, page 311), said they had earned during the past year £61,490 in fares, and £1,122 from the carriage of parcels, making in all £62,612. The working expenses amounted to £32,077, which left a balance of £30,351. To that had to be added interest on Loft House debentures, bank interest and transfer fees—in all £458. The net revenue account stood at £30,993. They had to deduct from that the London charges amounting to £3,117, which left £27,875 to be carried forward to the appropriation account, and to that had to be added the carry forward from last year £8,509, which gave them an available balance of £36,385. They proposed to utilise that sum as follows: £11,756 to pay the interest on the first mortgage; £1,624, interest on the 6 per cent. bonds; £11,268 had been hypothetically placed to renewal and depreciation account, of which £7,367 had been

actually spent. Five thousand pounds had again been placed to the general reserve, which now stood at £10,000, and their insurance had cost £441. All those items amounted to £22,727, which left £13,661 to be carried forward. They had this year effected an insurance on their plant for the first time, as previously they had set aside a special reserve to meet that contingency. They had spent £2,000 in relaying and paving the track at Bell Hill, near Leeds. A part of the Winnimire line had been repaved; that had been done at the expense of the company, as they had unfortunately not been able to recover anything from the colliery-owners or the highway authorities. They had had a lot of trouble with their tracks, and they had come to the conclusion that macadam would not do, so they had set aside £2,000 so as to repave the tracks with granite setts. They had put in an additional high-tension cable at Leeds, and at their stations they had put in superheaters. Although the cost of coal and fuel had been greater, the cost per unit of electricity generated had decreased. The number of passengers carried was 9,056,123, and they had run 1,803,015 car-miles, and had received in passenger fares £61,490. Compared with the year ending December 31st, 1907, these figures showed that they had carried 428,876 more passengers, increased their car-mileage run by 44,346, and they had taken £2,255 more in fares. During the four years of the company's existence, they had made slow but sure progress. The receipts per car-mile per passenger carried were 8·334d., as compared with 8·226d. last year. An increase of ½d. per car-mile would mean an addition to their receipts of £3,750. The working expenses showed an increase of £2,057. The percentage of expenses to receipts was 51·230, as against 49·552. They had, however, to remember that, as a company increased its work, its expenses must necessarily increase also. The largest item in their expenses was the wages, and they showed an increase of £531. They had been able to enter into a contract whereby they would be able to obtain their coal for the next three years at 5s. 0½d. per ton. The high prices of coal and oil had greatly increased their works costs. With reference to the assessment of the line at Wakefield, they had been successful in getting it reduced. Originally it was assessed at £1,237, but it was then raised to £3,000. They appealed to the Assessment Committee of the Council, and it was reduced to £2,250. However, they did not consider that satisfactory, so they appealed again, and they got it reduced to £1,625. Their relations with the local authorities were most amicable. They now ran their line right up to the middle of Pontefract town, and had also made a physical junction at Osset with the Dewsbury tramways. They had not got any arrangement for through running powers, as they did not think it a wise step to do so. A year ago he expressed a hope that they might this year declare a small dividend on the preference shares, but he much regretted that they were unable to do so. Having spent £9,500 on the Loft House line, the directors had no intention of laying out any more money in that direction. All their debts had had to be paid out of capital instead of revenue. What they were short of was capital, and to put their business in ship-shape form and up-to-date order they wanted at least £50,000 more cash—not raised by debentures, but in shares. It was to be hoped that in a few years' time, if the present policy of the board was continued, there would be a steady income for the holders of the shares.

Mr. E Schenk seconded the resolution.

Replying to shareholders' criticisms, the Chairman said that the Loft House undertaking was started after careful consideration had been given to the matter, and they had every reason to believe that it was a fair speculation. They believed that it had benefited the company indirectly, and they hoped that before many years had passed it would have direct results. The working of the undertaking had come up to the anticipation set forth in the prospectus.

The report was adopted.

Scarborough Electric Supply Co., Ltd.

The annual meeting was held at Scarborough on Tuesday, March 2nd.

The Chairman (Mr. G. Alderson-Smith), in moving the adoption of the report (see Electrical Review, March 5th, page 394), said that the amount for transformers and meters, £545, was large, but the Board of Trade insisted on their charging to capital account, meters and lamps that were purchased to let out on hire. From these they got a very satisfactory return of £148 odd. The balance was £365 less for the past year; they had done more business and made less profit. The reason was partly bad trade at Scarborough, the necessity for instituting economies on the part of their consumers, and the cheapness of incandescent gas lighting. The last was a very serious cause. They had to make concessions to keep their customers. With improved lights less current was used, and some customers had introduced transformers, reducing their voltage and also reducing their bills. There was no denying that the company had been far too liberal in the dividend payments in the past. It was an open secret that he was against the payment of 4 per cent. last year.

Mr. A. A. Campbell Swinton (managing director) seconded. He emphasised the fact that they had done more business at less profit. Last year they supplied 830,000 odd units, against 490,000 in 1903, and the difference in price was only about £200. In the meantime, of course, the tramways had come in, and were supplied by the Electric Supply Co.'s current and the results were very striking. In order to keep business, they had found it necessary to reduce the price to the customers. The average price at the present moment was 3·35d.; in 1903 it was 5·41d. The only way of competing with incandescent gas was to reduce the price of electricity. The new metallic-filament lamps were becoming more and more important. In the long run they, with the flame arc lamps, which were very successful, were bound to be very beneficial to electric supply companies. They would enable them to compete with other illuminants. The money result was not necessarily good, and they were at the present moment to some extent suffering from that fact. The only way to make it up was by getting new customers, and they got 46 new customers last year, which was considerably more than for some time past. They had done that with a very small additional capital expenditure. They had plenty of machinery at the works, and were not likely to want to spend anything more for some very considerable time.

Mr. G. S. Peck, formerly resident engineer to the company, moved a direct negative to the resolution, and said he intended to come to those meetings annually until the board and himself saw together. How did they propose to meet the capital expenditure resulting from new customers? He hoped they were not going to put debentures on ahead of the ordinary shareholders. The alarming feature was the depreciation account. They had been working 17 years, and since the inception of the company to now the depreciation was ·7 per cent. The attitude of the managing director towards the depreciation account was also alarming, namely, that it was practically lost money to the company; and that when the company was taken over by the Corporation they would lose that depreciation. The 3 per cent. had not been earned, and they ought not to take anything in view of the loss of revenue which would occur when the new lamps got thoroughly on the market. Proceeding, he complained of not being supplied by Mr. Swinton with information for which he had asked. As to the bargain for the supply of current to the tramways, he said the tramway company paid 1·3d. per unit. If they knocked off ½d. for interest charges the Electric Supply Co. was not going to get fat on the remainder.

Mr. Jas. Ellis (Newcastle) seconded the amendment. As a business man he thought they had no right to pay that dividend. They were sliding back. They had not earned the dividend, and the depreciation fund had not been stood up to. He argued that they wanted to get at the small consumers.

Mr. Peck wished to put it to the auditor whether the depreciation account was sufficient, also whether a dividend had been earned, but it was ruled that those were not matters for the auditor at all.

Mr. Swinton, replying to the above and other speakers, said that depreciation was all a matter of how the plant was maintained. He would remind the shareholders that depreciation did not appear in the accounts of any of the railway companies of Great Britain. This was because they did all their repairs and renewals out of revenue. The Electric Supply Co. had hardly any of the original machinery put into the station now in existence. The plant was kept up and was all in first-rate order. The next thing that would want replacing would be one of the boilers, and that would not be for at least eight years from now, and it would only be a matter of £600 or £700.

The amendment was put and lost, only five voting out of an attendance of 15 shareholders (including the four directors present). The mover and seconder voted for the amendment and three against it.

The resolution was then adopted.

Kensington and Knightsbridge Electric Lighting Co., Ltd.

The meeting of this company was held on Thursday, March 4th, at the offices, 148, Brompton Road, Col. R. E. Crompton presiding.

The Chairman said that they would see from the report (see Electrical Review, February 26th, page 350) that they had omitted to include the paragraph stating the number of houses that were connected with the company's mains. The reason they had done that was because it had become so misleading. That was the twenty-second annual meeting of the company, and during its existence the company had shown increased progress every year, until in recent years the rate of progress had somewhat fallen off, owing to the fact that the houses in the district had become connected with the system. They had a large number of houses connected, which had been a source of income to the company, but which were now standing empty. He did not know how other companies were affected, but the fact remained that they had 500 houses which had been wired, but were now empty. That meant a considerable loss of revenue, for even supposing that the average gross receipts from those houses had been only £10 a year, it meant a gross income of £5,000, of which only a small proportion would go in expenses. The output of the company had diminished. For many years Messrs. Harrod's Stores had said they were going to install a plant of their own, and this year they had done so. His Majesty's Office of Works had also put down a plant for supplying the museums, and consequently that meant a considerable loss to them. For the first time they showed a reduction in their output of electricity, and what was even worse, that reduction was coupled with a reduction in the price. The result was that their receipts during the year showed a diminution of £1,800. On the other hand, they had met those reductions by very considerable economy. The cost of generating electricity at their Wood Lane station—which had worked very satisfactorily during the past year—showed that it was probably as low as it was possible to get it, considering the conditions of working in that part of London. They had thereby made considerable saving. Further than that, every possible means had been taken to cut down expenses. The total expenses, in-

cluding all charges, and the considerable amount which they had placed to the renewal fund, showed a reduction from £56,960 last year to £55,000 this year. That figure was excluding the very large sum which they paid in rates to the local authorities, which was almost equal to the amount which was paid to the ordinary shareholders as their dividend. They were appealing against their assessment, and they were hoping to get a reduction which would enable them to increase their dividend by 1 per cent. Referring again to the loss of supply to Messrs. Harrod's Stores and the Museum, he might mention that during the last few years they had been supplying these people at such a low rate, that practically they had everything to gain as they filled up their places with ordinary customers in future years. They were supplying the Victoria and Albert Museum, and they hoped to get a larger output and a somewhat better load factor, which would mean an increased income. As to the metallic-filament lamp, it was almost impossible, in view of losses which they had sustained in other directions, to say whether they had suffered from the introduction of those lamps. They were, however, inclined to think that they had not affected them. In view of the cheapness of using them, and the better light which they gave, although more of them might be used, it would not mean such a loss to the companies as at first appeared probable. They had placed practically the same amount to the renewals as in the previous year—£8,793, as against £8,697—bringing that fund up to £78,196. Owing to the illness of one of their directors, and the absence of another, they had not the necessary number of shareholders present to form a quorum, and they could not, therefore, put the adoption of the report. He accordingly moved a resolution for the declaration of the dividend.

Mr. R. W. Wallace, K.C., seconded the motion, and after a short discussion it was carried.

An adjourned meeting was to be held yesterday, Thursday, for the purposes of formally adopting the report.

Harrow Electric Lighting Co., Ltd.

At the annual meeting of this company, held on 6th inst., Mr. Spencer Hawes, who presided, said that during the year they had obtained 75 new consumers, added 1,562 consumers to the system, and sold over 20,000 additional units of energy. The most striking feature of the growth of the sales account, was that over 50 per cent. of the revenue was derived from the smallest class of consumer, or those using the slot meters. The company for the year paid a dividend of 5 per cent. A scheme for the extension of the generating works had been carried out during the year by the enlargement of the buildings and the erection by Babcock and Wilcox of a water-tube boiler, equipped with superheater and chain-grate stoker, together with a 300 kw. Howden-Crompton generator. The official trials of the electric generator had proved it to be highly efficient and economical. Its steam consumption at all loads came within the guaranteed limits, and as the new boiler had been designed for the use of small cheap coal, they were satisfied that considerable economy in the working expenses would be effected in the future. A new issue of 25,000 4½ per cent. debentures had been created.

City of London Electric Lighting Co., Ltd.

The directors' report for 1908 shows that there has been expended on capital account during the year for new buildings, plant, mains, &c., additions and extensions £28,306, to replace works dismantled £16,404, making £2,312,817. From this there was written off prior to December 31st, 1907, £176,436, and a further amount written off in respect of buildings, plant and other works dismantled during the year 1908, of £32,461, leaves the net expenditure at December 31st, 1908, £2,103,920, a net addition during the year of £12,249.

The directors have credited the first debenture stock premium redemption account with £1,342 from revenue for interest, raising the amount at the credit of the redemption account at December, 1908, to £57,263. They have also transferred the sums of £45,000 and £500 from net revenue account to reserve account. The balance at credit of reserve account as at December, 1908, stood at £236,720, in addition to which there were first debenture stock premium redemption fund £57,263, standing reserve for doubtful debts, &c., £3,000, and amount carried forward to 1909 £27,404, making the total reserves £324,387.

The total revenue for the year (including interest on investments and discounts, £1,705) had been £283,240. Expenses of generation and distribution were £71,448, repairs and maintenance of buildings, machinery, plant, mains and other works £11,107, rent, rates, taxes, management expenses and special charges £47,297 = £129,852, leaving £153,387 plus £20,474 brought forward from 1907, making a total available revenue of £173,861. Of this sum the following amounts have been distributed or provided for:—Interest on loan from bankers, consumers' deposits, &c, £3,381; interest on first and second debenture stock for year ended December 31st, 1908, £31,825; interest transferred to debenture stock premium redemption fund, £1,342; staff superannuation fund, £364; stores written down, £1,006; transfer to reserve account, £45,000; transfer for leasehold redemption, £50; leaving for dividends on preference and ordinary shares and for "carry forward" to 1909, £90,443.

The directors now recommend for the year a dividend of 6 per cent. per annum on the preference, and 6 per cent. per annum on the ordinary shares, less income-tax, requiring £63,039, and leaving to be carried forward to 1909, £27,404. Warrants for the balance dividends (6s. preference, 7s. ordinary) will be posted on March 17th. The following are from tables accompanying the report:—

	1906.	1907.	1908.	Compared with 1907.
Gross revenue from all sources ..	£262,768	£280,860	£283,239	+£2,379
Net revenue available for reserve, interest on debenture stock, &c., dividends and special charges	£145,974	£158,749	£153,387	—£5,362
Private supply for all purposes: average price per unit obtained	2·67d.	2·63d.	2·55d.	—
Customers being supplied (private supply)	£12,295	£12,521	£12,582	+ £361
kw. connected (private supply), including power and heating	£30,009	£33,681	£35,468	+£1,787

On February 17th, 1909, there were 36,722 kw. applied for, out of which 33,59[illegible] were connected, and the customers numbered 12,917.

Units Generated, &c. (including Public Street Lighting).

	1907.	1908.
Generated	26,398,5[illegible]0	27,3[illegible]5,608
Sold	23,684,675	24,560,406
Metered and used by the company ..	744,810	739,035
Expended in distribution, &c.	1,964,265	2,016,167
Maximum supply demanded, kw. ..	17,908	19,168

The total units sold during 1908 show an increase of 875,831 over the quantity sold during 1907.

The power and heating supplies continue to show a steady increase, the total units sold in 1908 being: Power, 6,008,091 units; heating, 1,045,781 units = 7,053,872 units, together being equal to 30·28 per cent. of the total units sold for private supply.

The Corporation of London has not yet come to any decision as regards public street lighting. In the meantime the company is continuing to light the majority of the main thoroughfares, and has offered to introduce more modern lamps throughout the City on favourable terms to the Corporation. This offer has not yet been accepted.

The report mentions the rejection of the London and District Electricity Supply Bill, and the success of the London (Westminster and Kensington) Electric Supply Companies' Act, which contains provisions empowering four companies to link up their systems with the remaining London companies. In regard to the London Electric Supply Act (1908), which was promoted by this company in conjunction with seven other London companies, and which received the Royal Assent, the report says:—

> Your company is thereby empowered, *inter alia*—
> To supply in bulk to or enter into working agreements with other London companies and local authorities.
> To lay connecting mains, &c.
> To supply electrical energy to railway companies.

The Act also vests in the L.C.C., as the sole purchasing authority, the right to purchase in 1931, the undertakings of the eight London Electric Supply Companies promoting the Act; it provides that the purchase of all the companies' undertakings shall be simultaneous, that three years' notice of its intention to purchase shall be given, and that during these three years the companies shall have the right to call upon the L.C.C. to provide funds for capital outlay upon certain conditions. Your company is to receive compensation for the date of purchase being ante-dated by one year. The existing right of the City Corporation to purchase your company's undertaking in 1944, by agreement, remains unaffected by the provisions of this Act. Your board consider that this Act will not only prove to be beneficial to your company and other London companies affected, but that it will put an end to the promotion of further competitive schemes for the supply of electricity in bulk in London, the opposition to which has involved so much expenditure in time and money during recent years. The expenditure in connection with the Act, amounting to £5,936, has been charged to capital account.

Newcastle-upon-Tyne Electric Supply Co., Ltd.

The directors' report to be presented at the annual meeting on March 25th, says that the connections to the company's system at the end of 1908 amounted to 111,484 h.p., which, compared with the previous year's figure of 92,764 h.p., show an increase of 18,720 h.p. The profit for the year, including the balance of £2,025, brought forward, amounts to £75,087, against which has been charged interest on debentures, loans, &c., amounting to £25,939, leaving an available balance of £49,148, out of which the directors recommend a dividend of 5 per cent. for the year on the old preference shares, and at the rate of 5 per cent. per annum on the new preference shares, requiring £27,608 (of this an interim dividend was paid in July last, amounting to £11,924); a dividend of 2½ per cent. for the year on the old ordinary shares (this was paid in July last) and at the rate of 2½ per cent. per annum on the new ordinary shares (of this an interim dividend was paid in July last, amounting to £986), £13,804; there is transferred to depreciation account £5,000, and carried forward £2,736. The reserve account at December, 1907, stood at £26,984; to this have been added the premiums on shares sold during the year (after deducting the costs in connection therewith, &c.), amounting to £10,006, making a total of £36,989, out of which the directors have transferred to depreciation account £20,000, leaving at the credit of reserve account £16,989. The general depreciation account which, at the end of 1907, stood at £58,500, has thus been increased—through the above transfer of £20,000 and £5,000 set aside out of profits—by £25,000, making a total of £83,500, which is in addition to the amount of £150,000 written off in 1906 in reduction of capital expenditure. The depreciation and reserve accounts together now stand at £100,489. The profit of the year has been greatly affected by strikes and general trade depression, and also by the continued high price of coal which has ruled for the past two years; the loss under the former heads is estimated to be not less than £18,500, and the increased cost under the latter £17,500. Since the close of the year, however, the price of coal has reverted to its former level, while the revenue shows an increase over that of the corresponding period of last year, *i.e.*, before the strikes took place. The whole of the company's plant and system has been maintained in an efficient state, over £37,000 having been expended

during the year, out of revenue, on repairs and renewals and on alterations and improvements to plant, boilers, mains, &c., with a view to further economies and advantages to the system. The outlay on capital account during the year, represented by expenditure on the new power station at Dunston, the tunnel under the Tyne, and ordinary extensions, has been £183,081. The river tunnel, the completion of which was seriously delayed by unforeseen circumstances, is now in use, and considerable economies will result when all the cables therein are connected up, as they will be, in the course of the next few weeks. The progress of the new power station at Dunston has been satisfactory, and it is anticipated that the station will be brought into operation about the beginning of next year. This station, and its connecting cables, will be sufficient to deal with all demands for supply which the directors foresee. The issue of new capital, amounting to £500,000, mentioned in the last report, was made during the year, and all the shares were allotted. During the year Mr. Leonard D. Cunliffe was appointed to a seat on the board.

Bournemouth and Poole Electricity Supply Co., Ltd.

The directors' report for 1908 says that the capital expended during the year on the Bournemouth, Poole, Christchurch and Pokesdown orders amounted to £11,301, making the total on those orders, £432,499. The balance brought forward was £939, and the balance, after deducting generation and distribution costs, rent, rates, taxes, wages, directors' fees, general establishment and other charges, and proportion of salaries, was £32,648, making a total available revenue for the year 1908 of £33,587. Interest on debenture stock and on temporary loans, less income-tax, absorbed £7,872; leasehold and special redemption funds and interest, £1,496; amount carried to reserve for depreciation, repairs, renewals, &c., £3,000; and after paying the year's dividends on the two classes of preference dividends a final dividend on the 15,000 ordinary shares for the half-year ended December 31st, 1908, at the rate of 7 per cent. per annum, less income-tax, is recommended (the interim dividend was at the rate of 5 per cent. per annum), leaving £913 to be carried forward. The total applications received at December 31st last amounted to the equivalent of 206,185 30-watt lamps (6,185 kw.), being an increase of 21,344 (640 kw.) for the year. The total number of Board of Trade units sold for all purposes was 3,005,714, being an increase of 145,180 for the year. An issue of £37,500 4½ per cent. debenture stock was made to the existing debenture stock and shareholders in May last. The directors of the Richmond (Surrey) Electric Light and Power Co., Ltd., have declared a dividend of 5 per cent. on the ordinary shares of that company for the year 1908. The following is a statement of electricity generated, sold, &c.:—

Units generated	3,853,972
Sold—Public lamps	23,399
Private consumers by meter	2,982,315
Total sold	3,005,714
Used on works	393,689
Total accounted for	3,399,403
Not accounted for	454,569
Public lamps	129
Total maximum supply demanded, kw.	2,459

Metropolitan Electric Supply Co., Ltd.

The meeting of this company was held on Tuesday at Winchester House, Mr. W. Harrison Cripps presiding.

In moving the adoption of the report (see Electrical Review, March 5th, page 399), the Chairman said that the capital expended during the year (£34,000), was the smallest in any one year in the company's history, and the biggest item was £5,000 for Parliamentary expenses. As they were aware, they, in conjunction with seven other companies, promoted a Bill in the last session of Parliament, and they each of them agreed to pay their own proportion of the costs. As theirs was £5,000, they could see what an enormous expenditure was incurred by the companies as a whole. Their revenue account showed an increase of about £2,000, and the working expenses a reduction of £2,636, which showed the great care which was taken by the staff. They intended to place to reserve £15,000 instead of £20,000 as last year. They had reduced the sum to be placed to that account because the spare plant at Willesden had not been so rapidly used as was anticipated. There was about 50 per cent. of the plant standing idle, due to the severance of the Marylebone undertaking, and, therefore, as that was not being depreciated to any great extent, they did not think that they need put so much money to reserve as heretofore. The dividend was 1 per cent. lower than last year, but he would remind them that they then had to take £21,000 from reserve. This year the dividend was fairly and squarely earned. Referring to the Parliamentary Bill, he said that ever since the electrical companies had been in existence the conditions under which they worked tended rather to increase the cost of distribution and generation of electricity than to decrease it. When they went to Parliament they said they were prepared to spend money in developing their electrical undertakings, but they asked that they should be protected. They all knew the result of Parliament's consideration of their Bill, but it was a matter of regret that Parliament had not seen fit to protect their capital. It might be thought that they ought to have shown a greater increase in their revenue, as they had shown such an increase in their lamp connections, but the metallic-filament lamp had had some effect on the business. He, however, believed that the metallic-filament lamp only showed a decrease in theory, for in actual practice they found that a great number of their customers did not cut down their expenditure, but rather increased the lighting on their premises. They were in hopes that the introduction of that lamp would mean increased demand for current. He thought that if the introduction of the lamp should mean that the price of electricity should become too low, the companies would have to consider the question whether directly or indirectly the price should not be raised. He hoped, however, that that would never be the case. For 21 years electrical companies had been in existence, and yet all round their average dividend had never exceeded 5 per cent. He did not think that could be considered a very high rate of interest, and as their tenure was quickly drawing to a close, he thought they ought to protect the great amount of capital which was invested in electrical undertakings. Having referred to the loss the company had sustained by the death of Sir Eyre Shaw, he concluded by paying a warm tribute to the services rendered by the staff during the year.

Lord John Hay seconded the motion.

Replying to shareholders' criticisms, the Chairman said that the reason why they had paid the Parliamentary expenses out of capital was because it might be that the arbitrator, when making his award when the company was taken over, would consider that "a reasonable and proper expenditure." The company had made great progress in their Middlesex area. They were already supplying Acton, and during the last few days they had signed an agreement for the supply to Hanwell, and within the next three days they would sign an agreement to enter another local area.

The report was adopted.

Direct Spanish Telegraph Co., Ltd.—The directors in their report for 1908 present accounts which show, after providing for interest on and redemption of debentures, and also for the dividend of 10 per cent. on the preference shares, a balance of £10,088. Out of this amount the sum of £5,000 has been transferred to the reserve fund, and the directors recommend the declaration of a final dividend for the half-year ended December 31st, 1908, at the rate of 4 per cent. per annum, free of income-tax, on the ordinary shares, amounting to £1,293. This makes, with the interim dividend paid on October 1st, 1908, a total of £2,586. The remaining balance of £2,501 has been transferred to the contingencies account. The traffic receipts show a decrease of £1,104, and the ordinary working expenses an increase of £276, as compared with the year 1907. The £20,000 4½ per cent. second mortgage debentures, issued in 1905, have now been redeemed. The company's cables, and the landlines in connection with them, have continued in good working order throughout the year. On January 19th, 1909, the Bilbao cable became interrupted close to the landing-place in Spain. Its repair was successfully carried out locally, communication being restored on February 3rd. The cost of the work, which is estimated at about £625, will be charged to the accounts for 1909.

Companies Struck Off the Register.—The following companies have been struck off the Register, and are accordingly dissolved:—

Advance Motor Starter Co., Ltd.
Hemsworth Electricity Supply Co., Ltd.
Home Counties Electricity Supply Co., Ltd.
Hyde Electrical Manufacturing Co., Ltd.
Hyderabad Electric Light and Traction Co., Ltd.
Irish Electrical Agency, Ltd.
Kroeger Light-Cure and Electro-Therapeutic Institutes, Ltd.
Ozone, Ltd.
Schulz Turbines, Ltd.
Telegraphone, Ltd.
Traction Unification, Ltd.

O. C. Hawkes, Ltd.—The report for 1908 shows a balance, including amount brought forward, of £5,733. The preference and ordinary dividends of 5 per cent. per annum paid last July required £4,250, and the 5 per cent. on the preference for the latter half of the year required £2,125. A fall in the demand and keen competition caused the reduced profits, and (according to the *Financier*) it has been necessary to fall back on the reserve fund to the extent of £1,000. This provides for the balance of interim dividend on the ordinary capital paid last July. £358 is carried forward. The reserve fund now stands at £32,000.

Hadfield's Steel Foundry Co., Ltd.—The directors, in their report for 1908, recommend that in addition to the interim dividend of 1s. per share paid in August last on the ordinary shares, a further dividend be paid on the ordinary shares of 2s. per share, together with a bonus of 6d. per share (all free of income-tax), the balance of £27,090 to be carried forward. Lord Claud John Hamilton has joined the board. It is thought desirable by the board that provision should be made to increase the number of directors, and a notice convening an extraordinary meeting has been issued.

Calcutta Electric Supply Corporation, Ltd.—The number of units delivered to consumers during the five weeks ended January 29th, 1909, was 496,075, compared with 401,412 units in the corresponding five weeks of 1908.

Ibbotson Bros. & Co., Ltd.—Interim dividend at the rate of 5 per cent. per annum for the half-year ended December, 1908.

Sao Paulo Tramway, Light and Power Co., Ltd.—A quarterly dividend of 2½ per cent. is announced.

ELECTRIC TRAMWAY AND RAILWAY TRAFFIC RETURNS.

Locality.	Fortnight ended.	Receipts for the fortnight. £	* £	No. of wks.	Total to date. £	* £	Route miles open.	Inc.
Aberdeen	Mar. 3	2,366	— 12	40	54,947	— 101	..	..
Ayr	,, 6	331	— 29	42	12,248	— 287	8	..
Bath	,, 6	1,103	— 18	9	5,265	+ 241	..	..
Belfast	,, 5	6,865	+ 42	49	177,697	+ 463	37	..
Birkenhead	,, 7	1,903	— 142	49	51,664	+ 267	13·52	..
Birmingham Corp.	Feb. 27	12,342	— 116	48	304,988	+ 7,472	..	..
Blackpool-Fleetw'd	Mar. 6	417	+ 29	9	2,147	+ 229	..	..
Bolton	,, 7	3,885	— 215	49	111,400	+ 1,386	26	..
Bournemouth	,, 3	2,419	— 260	48	76,879	— 3,696	21·96	..
Bradford	Feb. 27	8,574	+ 479	47	220,305	+ 1,086	54·9	..
Brighton	Mar. 7	1,224	— 96	48	43,457	+ 910	9·5	..
Bristol	,, 5	9,023	+ 45	..	..	..	..	..
Brit. Elec. Trac. Co.								
Airdrie	Feb. 26	423	— 1	8	1,756	+ 13	3·65	..
Barnsley	,, 26	330	+ 10	,,	1,302	+ 18	..	..
Barrow	,, 26	420	— 27	,,	1,612	— 93	5·37	..
Cavehill	,, 26	117	+ 6	,,	438	— 16	..	..
Devonport	,, 26	630	— 174	,,	3,113	— 229	8·85	..
Gateshead	,, 26	1,932	— 15	,,	7,797	— 62	11·25	..
Gravesend	,, 26	341	— 28	,,	1,395	— 91	6·5	..
Greenock	,, 26	871	— 29	,,	3,491	— 137	7·25	..
Hartlepool	,, 26	367	— 53	,,	1,556	— 216	6·72	..
Kidderminster	,, 26	150	— 23	,,	622	— 41	..	..
Leamington	,, 26	258	— 10	,,	1,097	+ 75	..	..
Merthyr	,, 26	381	— 7	,,	1,569	+ 30	2·9	..
Metropolitan	,, 26	10,266	+1,040	,,	42,386	+ 5,234	22	..
Middleton	,, 26	592	— 5	,,	2,283	— 50	8·5	..
Mid. Joint Com'tee	,, 26	10,387	— 490	,,	51,700	— 1,660	..	..
Oldham—Ashton	,, 26	1,045	— 73	,,	4,151	— 254	9·13	..
Peterborough	,, 26	177	— 28	,,	736	— 84	5·31	..
Potteries	,, 26	3,376	— 70	,,	13,774	— 560	29	..
Rothesay	,, 26	85	— 3	,,	352	— 11	2·75	..
Southport	,, 26	420	+ 25	,,	1,751	+ 181	8·17	..
S. Metropolitan	,, 26	1,245	— 23	,,	5,160	+ 164	..	..
Swansea	,, 26	1,637	+ 10	,,	6,808	+ 254	12·5	..
Tynemouth	,, 26	256	— 11	,,	1,020	— 99	3·75	..
Weston-s-Mare	,, 26	49	— 1	,,	209	+ 10	3	..
‡Worcester	,, 26	415	— 45	,,	1,811	— 37	5·75	..
Wrexham	,, 26	169	— 8	,,	704	+ 9	..	..
Yorks. Wool. Dist.	,, 26	1,645	— 26	,,	6,724	— 29	17	..
Miscellaneous	,, 26	856	— 3	,,	1,434	— 24	..	..
Burnley	Mar. 6	2,176	— 152	..	..	..	..	..
Burton-on-Trent	,, 7	142	— 54	49	12,918	— 725	10	..
†Bury	Feb. 28	953	— 46	47⅞	54,466	+ 1,680	..	..
Cardiff	Mar. 6	3,660	— 126	49	103,757	+ 236	..	..
†Carlisle	Feb. 2	154	— 1	52	9,210	— 34	..	..
Chatham and Dist.	Mar. 4	1,165	— 57	9	6,080	+ 557	14·98	2·77
Cork	,, 4	773	+ 11	9	3,656	+ 117	9·9	..
Croydon	,, 5	2,208	— 171	49	67,292	— 424	11·25	·75
Darlington	,, 6	359	— 35	49	9,488	— 15	..	..
Darwen	,, 5	418	— 31	48	11,933	— 345	4·36	..
Dover	Feb. 27	265	— 37	48	9,943	— 460	4·75	..
Dublin	Mar. 5	8,937	— 208	..	43,518	— 106	54·25	..
Dundee	,, 3	2,201	+ 89	41½	49,901	+ 1,940	14·5	..
East Ham	,, 6	1,573	— 36	49	42,910	— 618	8·48	·68
Exeter	,, 5	459	+ 5	48	14,759	+ 375	6·5	..
Glasgow	,, 6	31,595	—1,260	..	678,105	— 4,186	90·5	1·5
Hastings	,, 4	1,177	— 426	..	..	..	..	..
†Huddersfield	Feb. 27	1,417	— 39	48	75,188	— 842	28·5	·6
Hull	Mar. 6	4,615	— 248	49	120,295	— 541	13	..
Ilkeston	,, 3	236	— 9	48	6,692	— 116	3·5	..
Ipswich	,, 6	547	— 57	49	18,533	— 363	10·5	..
Kilmarnock	Feb. 27	260	— 29	41	6,200	— 292	4·25	..
Lan'kshire Trm.Co.	Mar. 4	2,251	— 28	9	10,865	— 551	17	1·18
Lancashire United	,, 3	2,297	+ 8	9	10,336	+ 195	39	1
Leeds	Feb. 27	12,013	+ 91	45	312,046	+ 3,654	96·75	·25
Leicester	Mar. 6	3,899	— 307	..	..	..	..	..
Leith	Feb. 27	911	+ 2	41	21,557	+ 79	6	..
Liverpool	,, 27	20,027	— 760	8⅔	85,565	+ 905	104	..
‡L.C.C.	,, 20	65,385	+5,711	..	1,625,703	+178,118	121	4·25
London United	Mar. 6	8,655	—1,777	..	44,396	— 2,967	..	..
†Lowestoft	Feb. 13	123	— 16	20	2,962	— 239	3·5	..
Manchester	Mar. 6	26,508	—1,209	49	738,732	+15,234	90·5	6
Newcastle	,, 6	7,387	+ 3	49	189,928	— 8,502	..	..
Newport	Feb. 27	1,102	— 35	48	30,915	— 1,145	14·5	..
Oldham	Mar. 7	3,293	— 282	49	94,717	— 703	28·75	..
Pontypridd	Feb. 27	706	+ 103	48	18,180	+ 4,905	5·5	1·75
†Portsmouth	,, 20	1,468	+ 30	47	91,350	— 1,516	14·5	..
Preston	Mar. 3	1,259	— 70	..	..	..	..	..
Rotherham	,, 4	1,079	— 60	48½	29,299	— 139	10	·66
Salford	,, 1	8,155	— 289	48	219,440	— 797	41	..
†Sheffield	Feb. 28	4,946	— 178	48½	267 849	— 3,584	37	1·25
Southampton	Mar. 3	1,649	— 155	48	50,609	+ 1,505	..	..
Southend-on-Sea	,, 3	532	+ 12	49	20,800	+ 2,024	..	..
South Shields	,, 6	968	— 6	..	27,001	— 328	..	..
†Swindon	Feb. 17	111	— 27	..	..	..	4·4	..
Tyneside	Mar. 3	747	+ 85	9	3,311	+ 92	8·87	..
Wallasey	Feb. 27	1,538	+ 78	47⅚	41,971	+ 2,440	6·72	·22
Walthamstow	Mar. 6	898	— 65	49	29,978	+ 1,829	9	..
West Ham	Feb. 25	4,049	— 131	48	105,180	— 4,381	15	·3
Wolverhampton	Mar. 3	1,296	— 227	48	39,336	— 1,425	12·5	..
Baker St.-Waterloo	,, 6	6 925	+ 670	9	31 010	+ 3,165	4·25	..
Cen. London Rly.	,, 6	11,202	—1,071	9	50,726	— 4,513	..	..
Char. +, Eus. Hamp.	,, 6	7,515	+1,165	9	34,455	+ 6,160	7.75	..
City & S. Lon. Rly.	,, 7	7,185	+ 275	9	30,854	+ 476	7·8	..
Dublin-Lucan Rly.	,, 5	205	+ 17	9	907	+ 98	7	..
G.N. and City Rly.	,, 6	3.288	— 256	9	14,446	— 1,988	3·5	..
G.N., P'dy. & Brmtn.	,, 6	11,655	+ 715	9	53,030	+ 4,415	9·25	..
L'pool Overh'd Rly.	,, 7	2.475	— 271	9	12,988	— 762	6·8	4·3
Mersey Railway	,, 6	3,785	+ 106	9	17,544	+ 584	4·5	..
Metropolitan Rly.	,, 7	30,786	+ 594	9	142,477	+ 4.655	24·5	..
Met. District Rly.	,, 6	19,089	+ 839	9	88,151	+ 7,281	24	..
Anglo-Argentine	,, 4	53,583	+15,092	9	236,482	+72,889	..	..
§Auckland	Jan. 29	13,711	+1,524	..	..	..	..	..
Bombay (B.E.T.)	Feb. 2	4,809	+ 54	5	12,450	+ 888	..	..
§Brisbane	Jan.	15,360	+1,020	..	..	..	..	..
Calcutta	Mar. 6	6,873	+ 378	..	..	..	..	..
§Geneva	Jan.	8,887	+ 634	..	..	..	..	..
Madras	Feb. 28	1.012	— 75	8	5,147	+ 96	..	..
Perth (W.A.)	Mar. 5	2,927	— 29	9	13,810	+ 218	..	..

* Compared with the corresponding period of 1908. † One week only.
‡ Includes horse, steam and other receipts. § One month.

STOCKS AND SHARES.

Tuesday Afternoon.

With Near Eastern politics still dominating the financial outlook no very settled conditions can be anticipated. There is a disposition, however, to regard war as outside the bounds of probability, and consequently the markets are taking a turn for the better.

New issues continue to be made fairly frequently. The City of Winnipeg has this week been offering half a million 4 per cent. stock at par, the money being required for "local improvements and power works, and for other purposes."

Movements have again been rapid in the stocks and shares of the Mexican-Canadian group. Mexican Light and Power rose 5, Mexican Tramways 4, Rio Trams 3½ to 103½, and other issues in the same division have registered smaller improvements. The market is controlled by a small section of operators, who please themselves as to what they do with the prices, and this afternoon, Tuesday, prices were lowered before the close of business.

It still appears anomalous that while Mexico Tramways Common Stock stands at 140, the company's 5 per cent. bonds are no better than 90½. If the former price is justifiable, it would seem that the bonds ought certainly to be worth several points more as a speculative investment.

Misunderstandings continue to arise, even now, on the point of these light and power companies' bonds. It may be explained that most of them are in the denomination of 500 dollars, equivalent in English to £102 14s. 10d. So the buyer who gives, say, 90½ for a 500 dollar bond has to pay, not £90 10s., but £92 19s. 7d. Of course, the calculation is reckoned in just the same way when he comes to sell.

Electrical railway issues are all steady, without showing material change. Metropolitan Consolidated slipped back ½. Districts remained firm, and London United Tramways Preference and Debenture stock are better. The Debenture has risen 3½ to 78½, without much business having been done in the stock. British Electric Traction fell another ⅛ to 3⅜. British Westinghouse 4 per cent. Debenture has lost a point again this week.

British Columbia Electric Railway Preferred has hardened a little, while Anglo-Argentine Tramways First Preference receded; Calcutta Preference are ⅛ better. Dublin United Tramways moved curiously, the Ordinary rising 5s. and the Preference losing a similar sum.

Telegraph stocks and shares are idle. The prevailing speculation in American Railroads finds reflection in rather jerky movements of Anglo-American Telegraph Deferred stock; on balance the price shows ⅛ fall as the result of the week's work. Indo-Europeans were picked up after their decline, and West India and Panama First Preference are another 2s. 6d. to the good at 8⅛. Eastern Extensions rallied to 12¼, and except for this the Eastern group has been without feature.

National Telephones retain their strength, but Monte Video Preference are again lower to a small extent. American Telephone and Telegraph dwindled to 131½ before recovering to 132. The Telegraph Trust companies' issues exhibit no change.

Electricity Supply shares show more rises than falls. Brompton's Ordinary and Preference, are ⅛ up; so are Westminsters and St. James's. City Lights fell ⅛, but the Preference gained 5s. County's are also ⅛ lower. Urban Preference are quoted nominally a trifle down.

The Industrial section is somewhat irregular. Babcock and Wilcox fell 1/16; Castner-Kellners continued their quiet advance. Cromptons have given way, and Electric Constructions are lower. India-rubber shares shed 5s.; rubber shares are generally firm. A good deal of curiosity has been aroused over the coming dividend on Vickers' shares.

Stewarts & Lloyds, Ltd.—After setting aside £70,000 for depreciation, the following dividends for the half-year ended December 31st are recommended:—At the rate of 6 per cent. per annum on the preference shares, and at the rate of 11 per cent. per annum on the ordinary shares, placing £30,000 to reserve fund, and carrying forward £85,900.

Muntz's Metal Co., Ltd.—The net profit for the year 1908 was £11,625, and further dividends at the rate of 5 per cent. per annum on the preference and ordinary shares are recommended, £3,010 being carried forward.

France.—La Société d'Electro-Metallurgie de Dives is declaring a dividend of 22½ fr. per share for the last financial year, as compared with only 20 fr. in the preceding 12 months.

SHARE LIST OF ELECTRICAL COMPANIES.

TELEGRAPH AND TELEPHONE COMPANIES.

Present Issue.	NAME.	Stock or Share. *	Dividends for the last four years. 1905.	1906.	1907.	1908.	Closing Quotations Mar. 2nd.	Closing Quotations Mar. 9th.	Business done week ended Mar. 9th, 1909. Highest	Lowest.	Rise + or Fall —	Present Yield per cent. £ s. d.
25,000	Amazon Telegraph Co.'s shares, Nos. 1 to 25,000	10	Nil	Nil	Nil	..	2⅞ — 3⅛	2⅞ — 3⅛	..	..	..	Nil.
186,700	Do. do. 5 % Debs., Nos. 1 to 1,250 Red.	100	5 %	5 %	5 %	5 %	91 — 94	92 — 95	..	..	..	5 6 5
$131,551,400	American Telephone & Telegraph, Cap. Stock ..	$100	7⅞ %	8 %	8 %	..	131½ — 132½	131½ — 132½	..	..	..	6 0 9
$53,000,000	Do. Collat. Trust, 4% Bonds, 1 to 28,000 and 53,001 to 78,000	$1000	4 %	4 %	4 %	4 %	95 — 97	95 — 97	96	95⅞	..	4 2 6
598,180	Anglo-American Telegraph	Stock	3½%	3½%	3½%	£3 4s.	55 — 58	55 — 58	..	..	..	5 5 3
3,200,910	Do. do. do. 6 % Pref.	Stock	6 %	6 %	6 %	6 %	99 — 101	99 — 101	100½	99⅝	..	5 18 10
3,200,910	Do. do. do. Deferred	Stock	1½ %	12⅝ %	1 %	8/-	13½ — 13⅝	13⅝ — 13⅝	13⅝	13 5/16	— ⅛	3 9 4
50,000	Anglo-Portuguese Tel., 5 % Mort. Deb. Stock Red.	100	5 %	5 %	5 %	5 %	98 —100 xd	100 —102	..	..	..	5 0 0
44,000	Chili Telephone, Nos. 1 to 44,000	5	8 %	8 %	8 %	..	7⅞ — 8⅛	7⅞ — 8⅛	..	..	..	4 15 6
2,431,350	Commercial Cable Stlng. 500 year 4 % Deb. Sk. Red.	Stock	4 %	4 %	4 %	4 %	84½ — 86½	85 — 87	84½	..	+ ½	4 12 0
16,000	Cuba Telegraph	10	5 %	5 %	6 %	..	7½ — 8½	7½ — 8½	..	..	..	6 6 4
6,000	Do. 10 % Pref.	10	10 %	10 %	10 %	10 %	16½ — 17½	16½ — 17½	..	..	..	5 14 8
12,981	Direct Spanish Telegraph, Ord.	5	4 %	4 %	4 %	4 %	3⅜ — 3¾	3 — 3¼	..	..	..	5 14 3
6,000	Do. do. 10 % Cum. Pref.	5	10 %	10 %	10 %	10 %	8 — 9	8 — 9	..	..	..	5 8 1
30,000	Do. do. 4½ % Debs.	50	4½%	4½%	4½%	4½%	99 —102	99 —102	..	..	..	8 16 6
60,710	Direct United States Cable	20	4½%	4½%	4½%	4½%	12½ — 12⅝	12½ — 12⅝	12½	12 5/16	..	6 9 3
48,000	Direct W. India Cable, 4½ % Reg. Deb., 1 to 1,200, R.	100	4½%	4½%	4½%	4½%	99½ —101½	99½ —101½	..	..	..	4 8
4,000,000	Eastern Telegraph, Ord. Stock	Stock	7 %	7 %	7 %	..	128 —131	128 —131	129½	128½	..	5 6 10
2,000,000	Do. 5½ % Pref. Stock	100	5½%	5½%	5½%	..	84½ — 86½	84½ — 86½	86	85½	..	4 0 11
1,896,706	Do. 4 % Mort. Deb. Stock. Red. ..	Stock	4 %	4 %	4 %	4 %	103½ —105½	103½ —105½	105⅜	104⅛	..	3 17 8
800,000	Eastern Extension, Australasia, and China Tele.	10	7 %	7 %	7 %	..	11⅝ — 12⅜	12 — 12⅜	12 5/16	12	— ⅛	5 12 0
752,400	Do. 4 % Deb. Stock	Stock	4 %	4 %	4 %	4 %	100 —102	100 —102	..	..	..	3 18 5
200,000	East & S. Afric. Tel., 4 % Mt. Db. (Mauritius Sub.) 1 to 8,000	25	4 %	4 %	4 %	4 %	100½ —102½	100½ —102½	..	..	..	3 18 1
181,127	Globe Telegraph and Trust	10	5½%	5½%	5½%	..	10½ — 10⅞	10½ — 10⅞	10⅝	10⅛	..	5 9 8
181,127	Do. do. 6 % Pref.	10	6 %	6 %	6 %	..	18 — 18½	18 — 18½	18⅛	18	..	4 8 11
150,000	Great Northern Telegraph, of Copenhagen.. ..	10	24%	20 %	20 %	..	30 — 32	30 — 32	31½	..	..	6 5 0
14,000	Halifax and Bermudas Cable, 4½ % 1st Mort. Debs., within Nos. 1 to 1,200, Red.	100	4½%	4½%	4½%	4½%	99½ —101½	99½ —101½	..	..	..	4 8 8
17,000	Indo-European Telegraph	25	18 %	18 %	18 %	..	51 — 54	52 — 55	53⅜	53½	..	5 18 11
$41,880,400	Mackay Companies Common	$100	2 %	8½%	4 %	4 %	74 — 78	74 — 78	77½	..	..	5 2 7
$50,000,000	Do. do. 4% Cum. Pref.	$100	4 %	4 %	4 %	4 %	71 — 74	71 — 74	..	..	..	5 12 8
394,190	Marconi's Wireless Telegraph	1	Nil	Nil	Nil	..	3— 7/16	3— 7/16	16/10½	..	..	Nil
72,680	Monte Video Telephone Co., Ltd. Ord.	1	5 %	6 %	6 %	6 %	3⅛ — 3⅜	3⅛ — 3⅜	16/-	..	..	6 0 9
86,492	Do. do. do. 5 % Pref.	1	5 %	5 %	5 %	5 %	3⅛ — 3⅜	3⅛ — 3⅜	..	..	..	5 4 2
2,225,000	National Telephone, Pref. Stock	100	6 %	6 %	6 %	6 %	109 —111	109 —111	109½	109	..	5 7 7
5,725,000	Do. do. Def. Stock	100	5 %	5 %	6 %	6 %	122 —124	122 —124	122½	122	..	4 16 9
15,000	Do. do. 6 % Cum. 1st. Pref.	10	6 %	6 %	6 %	6 %	10½ — 11½	10½ — 11½	..	..	..	5 6 8
15,000	Do. do. 6 % Cum. 2nd Pref.	10	6 %	6 %	6 %	6 %	10½ — 11½	10½ — 11½	..	..	..	5 6 8
250,000	Do. do. 5 % Non-cum. 3rd P., 1 to 250,000	5	5 %	5 %	5 %	5 %	5⅛ — 5⅜	5⅛ — 5⅜	..	..	..	4 5 1
1,000,000	Do. do. 3½ % Deb. Stock Red. ..	Stock	3½%	3½%	3½%	3½%	98 — 100	98 — 100	..	..	..	3 10 0
1,716,598	Do. do. 4 % Deb. Stock Red.	100	4 %	4 %	4 %	4 %	99½—101½	99½—101½	99⅛	..	..	3 18 10
179,318	Oriental Telep. and Elec. 1 to 171,504, fully paid ..	1	7 %	7 %	8 %	..	1 1/16 — 1 1/8	1 1/16 — 1 1/8	..	..	..	5 17 3
50,000	Do. do. do. 6 % Cum. Pref.... ..	1	6 %	6 %	6 %	..	1⅛ — 1¼	1⅛ — 1¼	24/3	..	..	4 16 0
99,100	Do. do. do. 4 % Red. Deb. Stock ..	100	4 %	4 %	4 %	4 %	88 — 90	88 — 90	..	..	..	4 8 11
99,400	Pacific & European Tel., 4 % Guar. Debs., 1 to 1,000	10	4 %	4 %	4 %	4 %	100 —102	100 —102	..	..	..	3 18 5
11,889	Reuter's	8	5 %	5 %	5 %	..	7½ — 8¼	7½ — 8¼	..	..	..	4 17 7
99,100	Telephone Co. of Egypt, 4½ % Deb. Red.	100	4½%	4½%	4½%	4½%	99 —101	99 —101	..	..	..	4 9 1
3,088	Submarine Cables Trust	Cert.	6 %	6 %	6 %	6 %	127 —130	127 —130	..	..	..	4 12 4
120,000	United River Plate Telephone	5	8 %	8 %	8 %	..	6⅝ — 7	6⅝ — 7	6 3/16	6⅛	..	5 14 8
40,000	Do. 5 % Cum. Pref., Nos. 1 to 40,000	5	5 %	5 %	5 %	5 %	4⅝ — 5⅛	4⅝ — 5⅛	5⅛	..	..	4 13 0
30,008	W. Coast of America, 1 to 30,000 & 53,001 to 53,008	2½	Nil	2½%	2½%	..	1½ — 1⅝	1½ — 1⅝	..	..	..	3 11 5
150,000	Do. 4 % Debs., 1 to 1,500 guar. by Bras. Sub. Tel.	100	4 %	4 %	4 %	4 %	100 —102	100 —102	100½	..	..	3 18 6
207,980	Western Telegraph, Ltd., Nos. 1 to 207,980.. ..	10	7 %	7 %	7 %	..	18 — 18⅝	12⅝ — 18⅝	18⅛	19 13/16	— ⅛	5 4 8
800,000	Do. do. 4 % Deb. Stock Red. ..	100	4 %	4 %	4 %	4 %	101 —103	101 —103	102½	101g	..	3 17 8
88,321	West India and Panama Telegraph	10	Nil	Nil	Nil	Nil	33/ — 35/	33/ — 35/	..	..	..	Nil
84,568	Do. do. 6 % Cum. 1st Pref.	10	5 %	8 %	6 %	6 %	7½ — 8¼	7½ — 8¼	8	7 15/16	..	6 9 9
4,669	Do. do. 6 % Cum. 2nd Pref.	10	Nil	Nil	£2 6	..	7½ — 8¼	7½ — 8¼	..	..	..	2 14 1
80,000	Do. do. 5 % Debs., Nos. 1 to 1,800 ..	100	5 %	5 %	5 %	5 %	100 —102	100 —102	..	..	..	4 18 0

ELECTRICAL RAILWAY, MANUFACTURING AND INDUSTRIAL COMPANIES.

220,000	Anglo-Argentine Trams, 10 % Nom. Cum. 2nd Pref., 260,008 to 580,097	5	8 %	8 %	9 %	..	8 1/16 — 9 3/16	8 1/16 — 9 1/16	9 1/16	..	..	4 12 11
260,007	Do. 6 % Cum. Prefs., 1 to 260,007 ..	5	5½%	5½%	6¼%	..	6 — 6¼	5⅝ — 6⅛	..	..	— ⅛	4 13 11
266,600	Do. Permanent, 6 % Deb. Stock, 1888	100	6 %	6 %	6 %	6 %	137 —142	137 —142	..	..	..	4 4 6
265,100	Auckland E. Trams, 5 % 1st Mort. Deb. Stock ..	100	5 %	5 %	5 %	5 %	102 —104	102 —104	..	..	..	4 16 2
580,000	Babcock & Wilcox, 1 to 580,000..	1	20 %	20 %	20 %	..	4⅛ — 4⅜	4 3/16 — 4 5/16	86/8	85/-	— 1/16	4 12 0
100,000	Do. do. 6 % Cum. Pref., 1 to 100,000 ..	1	6 %	6 %	6 %	6 %	1 1/16 — 1 1/8	1 1/16 — 1 1/8	..	..	..	3 18 10
60,000	British Aluminium, Ord., 1 to 40,000	5	7 %	7 %	7 %	..	1⅝ — 2	1⅝ — 2	..	..	..	17 10 0
60,000	Do. do. 7 % Cum. Pref.	5	7 %	7 %	7 %	7 %	3⅛ — 3⅜	3⅛ — 3⅜	..	..	..	8 12 5
40,100	Do. do. "A" 6 % Cum. Pref.	5	6 %	6 %	6 %	6 %	3⅜ — 4⅛	3⅜ — 4⅛	..	..	..	7 1 2
12,897	Do. do. 4 % Funding Certs.	5	4 %	4 %	4 %	4 %	3⅜ — 4⅛	3⅜ — 4⅛	..	..	..	4 8 11
124,400	Do. do. 5½ % Loch Leven Debs. ..	100	..	5½%	5½%	5½%	96 — 98	96 — 98	..	..	..	5 12 3
500,000	British Columbia E. Rail Def. Ord. Stock	100	6 %	6 %	8 %	8 %	137 —140	137 —140	138⅝	138½	..	5 14 4
400,000	Do. Pref. Ord. Stock	100	5 %	5 %	5 %	6 %	118 —120	119 —124	123	120½	+2½	4 16 9
300,000	Do. 5 % Cum. Perp. Pref. Stock	100	5 %	5 %	5 %	5 %	104 —106	105 —107	106	104½	+¼	4 15 3
238,000	Do. 4½ % 1st Mort. Debs., 1 to 6,250	40	4½%	4½%	4½%	4½%	102½—104½	102½—104½	..	..	..	10 16 3
250,000	Do. 4½ % Vancouver Power Debs., 1 to 2,200	100	4½%	4½%	4½%	4½%	101 —104	101 —104	..	..	..	4 6 7
188,361	British Electric Traction	10	3 %	Nil	Nil	..	1⅛ — 1 3/16	1⅛ — 1 3/16	..	..	..	Nil
161,457	Do. do. 6 % Cum. Pref.	10	6 %	6 %	8 %	..	8¼ — 8⅜	8¼ — 8⅜	70/-	68/9	— ⅛	8 5 6
1,473,618	Do. do. 5 % Perp. Deb. Stock	Stock	5 %	5 %	5 %	5 %	90 — 95	90 — 95	..	..	..	5 5 3
528,936	Do. do. 4½ % 2nd Deb. Stock Red.	100	4½%	4½%	4½%	4½%	73 — 75	73 — 75	..	..	..	6 0 1
100,000	British Insulated and Helsby Cables	5	8 %	10 %	10 %	10 %	6⅞ — 7⅛	6⅞ — 7⅛	6⅞	6⅝	..	7 2 10
100,000	Do. do. 6 % Cum. Pref.	5	6 %	6 %	6 %	6 %	6⅛ — 6⅜	6⅛ — 6⅜	..	..	..	4 12 4
500,000	Do. do. 4½ % 1st Mort. Deb. Red....	100	4½%	4½%	4½%	4½%	104 —107	104 —107	..	..	..	4 4 1
908,440	British Thomson-Houston 4½ % 1st Mort. Debs.	100	4½%	4½%	4½%	4½%	88 — 93 xd	91 — 96	..	..	+3	4 18 11
400,000	British Westinghouse 6 % Pref., 1 to 200,000 and 275,001 to 475,000	5	Nil	Nil	Nil	..	5/16 — 9/16	5/16 — 9/16	..	..	..	Nil
1,016,858	Do. do. 4 % Mort. Deb. Stock ..	100	4 %	4 %	4 %	..	40 — 45	39 — 44	..	..	—1	9 1 10
50,000	‡Browett, Lindley & Co., Ord.	1	Nil	Nil	Nil	..	5/16 — 7/16	5/16 — 7/16	..	..	..	Nil
60,000	‡ Do. do. 6 % Cum. Pref.	1	Nil	Nil	Nil	..	14/6 to 15/6	14/6 to 15/6	..	..	..	Nil
140,976	Brush Electrical Engineering, Ord., 1 to 105,781 ..	2	2½%	Nil	Nil	..	0 — ¼	0 — ¼	..	..	..	Nil
200,000	Do. do. Non-cum. 6 % Pref.	2	6 %	Nil	Nil	..	1/16 — 3/16	1/16 — 3/16	..	..	..	Nil
125,000	Do. do. 4½ % Perp. Deb. Stock ..	Stock	4½%	4½%	4½%	..	57 — 62 xd	57 — 62	..	..	..	7 5 2
125,000	Do. do. 4½ % Perp. 2nd Deb. Stock..	Stock	4½%	4½%	4½%	..	38 — 42	38 — 42	..	..	..	10 14 4
127,610	Calcutta Trams, 1 to 127,610	5	8 %	8 %	6 %	..	4⅛ — 5	4⅛ — 5	95/-	..	..	6 0 0
45,804	Do. 5 % Cum. Pref., Nos. 1 to 29,380..	5	5 %	5 %	5 %	5 %	4⅛ — 5⅛	4⅛ — 5⅜	..	..	+ ⅛	4 13 0
350,000	Do. 4½ % 1st Deb. Stock..	100	4½%	4½%	4½%	4½%	100 —103	99 —102	..	..	—1	4 8 8
86,000	Callender's Cable Construction shares	5	15 %	15 %	15 %	..	9⅛ — 10⅛	9⅛ — 10⅛	..	..	..	7 6 4
40,000	Do. do. 5 % Cum. Pref.	5	5 %	5 %	5 %	..	5⅛ — 5⅜	5⅛ — 5⅜	..	..	..	4 6 11
800,000	Do. do. 4½ % 1st Mort. Deb. Stock Red.	Stock	4½%	4½%	4½%	4½%	105 —107	105 —107	..	..	..	4 4 1
491,292	Cape E. Trams., 1 to 491,292	1	Nil	Nil	Nil	..	⅛ — ¼	⅛ — ¼	..	..	..	Nil
450,000	Castner-Kellner Alkali, 1 to 450,000	1	6 %	8 %	12 %	..	1⅝ — 1 11/16	1⅝ — 1¾	32/6	32/0	+ 1/16	6 17 2
210,153	Do. do. 4½ % 1st Mort. Deb. Stock	100	4½%	4½%	4½%	..	103 —107	103 —107	..	..	..	4 4 1
1,898,610	Central London Railway, Ord. Stock	Stock	4 %	4 %	3 %	3½%	63 — 65	63 — 65	64½	63½	..	5 8 2
558,195	Do. do. 4 % Pref. Stock	Stock	4 %	4 %	4 %	4 %	82 — 84	82 — 84	83	82	..	4 15 3
558,195	Do. do. Def. do.	Stock	4 %	4 %	2 %	2½%	45 — 47	45 — 47	..	..	..	5 2 0
1,460,000	City and South London Railway	Stock	1½%	2½%	2½%	1½%	26½ — 27½	26¾ — 27½	27½	27	..	5 9 1
85,000	Crompton & Co., Nos. 1 to 85,040	5	2½%	5 %	5 %	5 %	1⅛ — 1⅜	1 — 1⅛	22/6	20/7½	— ⅛	11 2 2
100,000	Do. 5 % 1st Mort. Reg. Debs., 1 to 900 of £100, and 901 to 11,600 of £50 Red.	..	5 %	5 %	5 %	5 %	96 — 99	96 — 99	..	..	..	5 1 0

* Unless otherwise stated, all shares are fully paid † A period of nine months. ‡ From Manchester Share List.

Continued on next page.

SHARE LIST OF ELECTRICAL COMPANIES.—(*Continued.*)

ELECTRICAL RAILWAY, MANUFACTURING AND INDUSTRIAL COMPANIES.—(*Continued*)

Present Issue.	NAME.	Stock or Share.	Dividends for the last four years. 1905.	1906.	1907.	1908.	Closing Quotations Mar. 2nd.	Closing Quotations Mar. 9th.	Business done week ended Mar. 9th, 1909. Highest	Lowest.	Rise + or Fall —	Present Yield per cent. £ s. d.
260,000	Dick, Kerr & Co., 1 to 260,000	1	10 %	10 %	10 %	10 %	1⅛ — 1⅝	1⅛ — 1⅝	..	..	..	7 12 5
305,000	Do. do. 6 % Cum. Pref., 1 to 305,000	1	6 %	6 %	6 %	6 %	1⅛ — 1¼	1⅛ — 1¼	..	..	..	4 16 0
276,880	Do. do. 4½ % Deb. Stock	100	4½ %	4½ %	4½ %	4½ %	101 —104	101 —104	..	..	..	4 6 7
60,000	Dublin United Trams. (1896), 1 to 60,000	10	6 %	6 %	6¾ %	6 %	11⅜ — 12½	11⅛ — 12½	..	..	+ ⅛	4 16 0
60,000	Do. 6 % Pref. between 1 and 60,000	10	6 %	6 %	6 %	6 %	12⅜ — 13⅜	12⅜ — 13⅜	..	..	— ⅛	4 8 11
99,261	Edison & Swan Utd., "A" shs., £3 pd., 1 to 99,261	5	4½ %	4½ %	4½ %	..	1⅝ — 1⅞	1⅝ — 1⅞	..	..	..	16 15 3
17,139	Do. "A" shares, 01—017,139	5	4½ %	4½ %	4½ %	..	2⅛ — 2⅜	2⅛ — 2⅜	..	..	..	8 6 9
317,875	Do. 4 % Deb. Stock Red.	100	4 %	4 %	4 %	4 %	75 — 78	75 — 78	..	..	..	5 2 7
67,720	Do. 5 % 2nd Deb. Stock Prov. Certs. all pd.	100	5 %	5 %	5 %	..	86 — 89	86 — 89	..	..	..	5 12 4
112,100	Electric Construction, 1 to 112,100	2	Nil	Nil	Nil	Nil	⅛ — ⅜	⅛ — ⅜	..	..	— 1/16	Nil
31,890	Do. do. 7 % Cum. Pref., 1 to 31,890	2	7 %	7 %	7 %	7 %	1⅛ — 1½	1⅛ — 1½	..	..	..	9 6 9
26,000	General Electric Co. (1900), 5 % Cum. Pref.	10	5 %	5 %	5 %	..	7 — 7½	7½ — 7¾	..	..	+ ¼	6 9 0
200,000	Do. do 4 % Mort Deb.	Stock	4 %	4 %	4 %	4 %	85 — 89	85 — 89	..	..	..	4 9 11
78,000	Gt. N. & City Rail. Pref. Ord. "A" 4 %, 1 to 78,000	10	4 %	4 %	⅜ %	Nil	⅜ — ⅝	⅜ — ⅝	..	..	..	3 6 8
96,000	Greenwood & Batley, 7 % Cum. Pref.	10	7 %	7 %	7 %	..	10¼ — 10½	10¼ — 10½	..	..	..	6 10 3
80,000	Do. do. 5 % Mort. Debs.	100	5 %	5 %	5 %	5 %	102 —103	102 —103½	..	..	..	4 16 10
40,000	Henley's (W. T.), Telegraph Works, Ord.	5	15%	15 %	15%	15 %	12 — 13	12 — 13	12⅝	12⅝	..	5 12 5
40,000	Do. do. 4½ % Pref.	5	4½%	4½%	4½%	4½%	5 — 5⅛	5 — 5⅛	5⅛	..	..	4 1 10
150,000	Do. do. 4½ % Mort. Deb. Stock	Stock	4½%	4½%	4½%	4½%	106 —108	106 —108	..	..	..	4 3 4
50,000	India-Rubber, Gutta-percha & Telegraph Works.	10	10%	10 %	10 %	..	15⅜ — 16½	15⅜ — 16½	..	..	— ⅛	6 3 1
37,500	†Liverpool Overhead Railway, Ord.	10	Nil	Nil	⅜%	Nil	1 — 1⅛	1 — 1⅛	..	..	..	5 6 8
10,000	† Do. do. Pref., fully paid	10	5 %	5 %	5 %	5 %	4⅜ — 5½	4⅜ — 5½	..	..	..	9 10 6
600,070	London United Trams. (1901), 1 to 50,007	10	3 %	3 %	3 %	..	6½ — 6⅝	6½ — 6⅝	..	..	..	4 8 11
399,980	Do. do. 60,008 to 100,000	10	3 %	3 %	3 %	..	6½ — 6⅝	6½ — 6⅝	..	..	..	4 8 11
125,000	Do. do. 5 % Cum. Pref., 1 to 125,000	10	5 %	5 %	5 %	..	4 — 4⅛	4⅛ — 4⅜	..	..	+ ⅛	10 10 6
1,381,000	Do. do. 4 % 1st Mort. Deb. Stock	100	4 %	4 %	..	4 %	73 — 77	76 — 81	..	..	+3⅛	4 18 9
5,782,062	Metropolitan Consolidated	100	2⅜%	1 %	⅛%	⅛%	85½ — 86½	35 — 36	35⅞	35⅝	— ⅜	1 7 9
2,640,214	Do. Surplus Lands	100	2⅜%	2⅜%	2⅜%	2⅜%	69 — 71	69 — 71	70	69½	..	3 17 6
3,235,000	Do. District	100	Nil	Nil	Nil	Nil	13⅞ — 14½	13⅞ — 14½	14½	13⅞	..	Nil
314,016	Metropolitan Electric Trams., Defd.	1	Nil	Nil	Nil	..	3/16 — 5/16	3/16 — 5/16	..	..	..	Nil
800,000	Do. do. 5 % Cum. Pref.	1	5 %	5 %	5 %	..	31/32 — 1 1/32	31/32 — 1 1/32	16/6	15/7½	..	5 19 5
600,000	Do. do. 4½ % Deb. Stock Red.	100	4½%	4½%	4½%	4½%	93 — 96	93 — 96	94½	93⅝	..	4 13 9
$6,000,000	Mexico Trams Co., Common Stock	..	..	..	..	..	135—137	136½—138½	140½	132½	..	..
$9,000,000	Do. 1st Mort. 50-year 5% Gld. Bds.	..	..	..	..	5 %	90½ — 91½	93½ — 94½	91	90	..	5 9 3
245,500	Potteries E. Trc.	1	4 %	4 %	4 %	4 %	1/32 — 1/16	1/32 — 1/16	..	..	..	8 0 0
245,500	Do. 5 % Cum. Pref.	1	5 %	5 %	5 %	5 %	1/32 — 1/16	1/32 — 1/16	..	..	..	6 17 11
245,000	Do. 4½ % Deb. Stock	100	4½%	4½%	4½%	4½%	89 — 92	89 — 91	..	..	—1	4 18 11
37,350	Telegraph Construction and Maintenance	12	15 %	15 %	17½%	15 %	32 — 34	32 — 34	33	32⅞	..	5 14 10
150,000	Do. 4 % Deb. Bds., 1 to 1,500 Red., 1909	100	4 %	4 %	4 %	4 %	100 —102	100 —102	..	..	..	3 18 5
1,000,000	Underground Electric Railway, 5% Prior Lien	..	..	..	..	..	98⅜ — 99½	99 —100	99⅝	98⅝	+ ⅛	..
2,800,000	Do. do. 4½% Bonds	..	..	..	..	4½%	81 — 83	81 — 83	81⅝	81½	..	5 9 9
4,900,000	Do. do. 6% Income Bonds	..	..	..	..	..	29 — 31	28 — 30	..	..	—1	..
66,666	Willans & Robinson, 1 to 30,000 & 30,001 to 116,666	1	Nil	Nil	10 %	..	3/16 — 5/16	3/16 — 5/16	..	..	..	10 0 0
66,666	Do. 6 % C.P., 30,001 to 30,000 & 125,001 to 141,666	5	Nil	..	6 %	..	2⅜ — 2½	2⅜ — 2½	..	..	..	10 8 8
246,404	Do. 4 % 1st Mort. Deb. Stock	..	4 %	4 %	4 %	4 %	68 — 72	68 — 72	..	..	..	5 11 1

ELECTRICITY SUPPLY COMPANIES.

15,000	Bromley (Kent) E.L. & P., 1 to 15,000	..	5⅛%	5⅛%	5⅛%	..	4⅛ — 5	4⅛ — 5	..	..	..	5 10 0
70,000	Do. do. 4½ % 1st. deb. stock	100	4½%	4½%	4½%	4½%	94 — 98	95 — 98	..	..	+ ⅛	4 11 10
80,275	Brompton & Kens. Elec. Lt. Sup., Ord., 1 to 20,000	5	10 %	10 %	10 %	10 %	8⅛ — 8⅜	8⅜ — 8⅞	..	..	+ ⅛	5 12 8
2,725	Do. do. 7 % Cum. Pref.	5	7 %	7 %	7 %	7 %	8 — 8½	8⅛ — 8⅝	8 1/16	8½	+ ⅛	4 1 2
336,876	Central Electric Supply 4 % Guar. Deb. Stock	100	4 %	4 %	4 %	4 %	98 — 101	99 —102	..	..	+ 1	3 18 5
80,000	Charing Cross and Strand Electricity Supply	5	5 %	5 %	5 %	5 %	4⅛ — 4⅜xd	4⅛ — 4⅜	82/6	..	..	5 5 3
80,000	Do. do. do. 4½ % Cum. Pref.	5	4½%	4½%	4½%	4½%	4⅛ — 4⅜	4⅛ — 4⅜	..	..	..	4 17 4
80,000	Do. "City Undertaking" 4½ % Cum. Prf.	5	4½%	4½%	4½%	4½%	3⅝ — 4⅜	3⅝ — 4⅜	..	..	..	5 9 1
445,736	Do. do. 4 % Deb. Stock Red.	100	4 %	4 %	4 %	4 %	96 — 98	96 — 98	98⅜	98	..	4 1 8
49,486	Chelsea Electricity Supply, Ord.	5	6 %	4½%	4½%	4½%	3⅜ — 4⅛	3⅝ — 4⅛	76/3	..	..	5 5 11
175,000	Do. do. 4½ % Deb. Stock Red.	Stock	4½%	4½%	4½%	4½%	102 —105	102 —105	..	..	..	4 5 9
70,595	City of London Elec. Lighting, Ord. 40,001—110,595	10	6 %	6 %	6 %	6 %	10⅜ — 11⅛	10¼ — 11	10 15/16	10⅜	— ⅛	5 9 1
40,000	Do. 6 % Cum. Pref., 1 to 40,000	10	6 %	6 %	6 %	6 %	12 — 12⅜	12¼ — 13	12⅜	..	+ ⅛	4 12 4
400,000	Do. 5 % Db. Stk., Scrip. (iss. at 115) all pd.	..	5 %	5 %	5 %	5 %	121 —123	121 —123	122	..	..	4 1 4
300,000	Do. 4½ % 2nd. Db. Stk., Prov. Crts., all pd.	100	4½%	4½%	4½%	4½%	99 —102	100 —103	..	..	+ 1	4 7 5
50,000	County of Durham Electrical Power, Ord.	5	4 %	4 %	2 %	..	2⅝ — 3	2⅝ — 3	..	..	..	3 6 8
50,000	Do. do. do. 5 % Pref.	5	5 %	5 %	5 %	..	3⅛ — 3⅜	3⅛ — 3⅜	..	..	..	6 13 4
200,000	Do. do. do. 5 % 1st Mtg. Deb.	Stock	..	..	..	5 %	96 — 98	96 — 98	..	..	..	..
40,000	County of London Electric Lighting, Ord. 1—40,000	10	5 %	5 %	5 %	5 %	8⅝ — 9⅛	8⅝ — 9⅛	8 1/16	..	— ⅛	5 9 7
50,997	Do. do. 6 % Pref., 40,001—60,000	10	6 %	6 %	6 %	6 %	10⅝ — 11⅞	10⅝ — 11⅞	11 1/16	10 15/16	..	5 6 8
400,000	Do. do. 4½ % Deb. Stock	..	4½%	4½%	4½%	4½%	105 —108	105 —108	106⅝	..	..	4 3 4
400,000	Do. do. 4½ % 2nd. Deb. Stock	Stock	4½%	4½%	4½%	4½%	100 —103	100 —103	..	..	..	4 7 5
80,000	Edmundson's Electric Corporation, Ord. Shares	5	4 %	Nil	Nil	Nil	3/16 — 5/16	3/16 — 5/16	..	..	..	Nil
80,000	Do. do. 6 % Cum. Pref.	5	6 %	3 %	Nil	Nil	1/16 — 1/8	1/16 — 1/8	..	..	..	Nil
430,500	Do. do. 4½ % 1st Mort. Deb. Stk.	100	4½%	4½%	4½%	4½%	59 — 62	59 — 62	..	..	..	7 0 8
$8,150,000	Electrical Dev.Co.of Ontario, 5% 1stMtg.Gold Bnds.	$500	..	..	..	5 %	82½ — 84½ xd	83 — 85	..	..	+ ⅛	5 17 8
10,000	Folkestone, 1 to 10,000	5	5⅛%	5⅛%	5⅛%	..	4⅛ — 5	4⅛ — 5	90/-	..	..	5 10 0
10,000	Do. 5 % Cum. Pref., 1 to 10,000	5	5 %	5 %	5 %	..	5 — 5⅛	5 — 5⅛	..	..	..	4 10 0
90,000	Do. 4½ % 1st Deb. Stock	100	4½%	4½%	4½%	4½%	95 — 98	95 — 98	..	..	..	4 11 10
15,000	Hove, 1 to 15,000	5	9 %	9 %	8½%	8½%	6⅞ — 7	6⅞ — 7⅛	6⅞	..	+ ⅛	5 19 4
$2,400,000	Kaministiquia Power Co., 5 % Gold Bnds.	..	..	..	..	5 %	96½ — 98½	96½ — 98½	..	..	..	5 0 0
21,000	Kensington and Knightsbridge Electric Ord.	5	10 %	10 %	10 %	8 %	7⅝ — 8	7⅝ — 8	..	..	..	6 1 3
90,000	Do. do. do. 4 % Deben. Stk.	Stock	4 %	4 %	4 %	4 %	93 — 96	93 — 96	..	..	..	4 0 0
111,000	London Electric Supply Corporation, Limited, Ord.	3	4 %	4 %	2½%	3 %	1⅞ — 2⅛	1⅞ — 2⅛	38/9	..	..	4 16 0
70,000	Do. do. do 6 % Pref.	5	6 %	6 %	6 %	6 %	5 — 5⅜	5 — 5⅜	..	..	..	5 11 8
374,395	Do. do. 4 % 1st Mort. Deb. Stk. Red.	Stock	4 %	4½%	4½%	4 %	92 — 96	92 — 96	..	..	..	4 3 4
200,000	Metropolitan Electric Supply, 1 to 100,000	5	10 %	8 %	6½%	5 %	4⅜ — 5⅛	4⅜ — 5⅛	5 3/32	97/6	..	6 3 10
76,121	Do. 4½ % Cum. Pref. 1—71,106	5	4½%	4½%	4½%	4½%	4⅜ — 5	4⅜ — 5	..	..	..	4 10 0
290,000	Do. 4½ % 1st Mort. Deben. Stock	..	4½%	4½%	4½%	4½%	106 —109	106 —109	..	..	..	4 2 7
248,000	Do. 3½ % Mort. Deben. Stock Redem.	Stock	3½%	3½%	3½%	3½%	85 — 88	85 — 88	..	..	..	3 19 7
$6,000,000	Mexican Electric Light Co., 5% 1st Mtg. Gold Bnds	..	5 %	5 %	5 %	5 %	86 — 87	86 — 87	86⅞	..	..	5 14 11
13,685,000	Do. Light and Power Co., Ltd., Common	$100	..	..	..	3½%	75½ — 76½	78 — 80	80½	75	..	4 11 6
$1,500,000	Do. do. 7% Cum. Pref. Stk.	Stock	..	..	..	7 %	109 —111	109 —111	..	..	..	6 6 2
$12,000,000	Do. do. 5% 1st Mtg. Gold Bnds.	..	..	..	..	5 %	89½ — 90½	89½ — 90½	90½	98⅛	..	5 10 6
250,000	Midland Electric Corporation, 4½ % 1st Mort. Deb.	100	4½%	4½%	4½%	4½%	95 — 98	95 — 98	..	..	..	4 11 10
87,500	Newcastle-on-Tyne, 1 to 87,500	5	8 %	8 %	8 %	..	3⅜ — 4⅛	3⅜ — 4⅛	..	..	..	9 8 3
87,500	Do. 5 % Pref., 1 to 87,500	5	5 %	5 %	5 %	..	5 — 5⅛	5 — 5⅛	..	..	..	4 10 11
126,500	North Metropolitan Electric Power Supply Co., 5 % Mortgages (Red.), Nos. 1 to 1,265	100	..	..	..	..	100 —102	100 —102	..	..	..	..
10,852	Notting Hill Electric Lighting	10	7½%	7½%	7½%	7 %	11⅛ — 12⅛	11⅛ — 12⅛	..	..	..	6 5 0
20,000	Oxford, 1 to 96 and 407 to 20,310	5	7 %	7 %	7 %	..	5⅝ — 6⅜	5⅝ — 6⅜	6⅜	..	..	5 9 10
60,000	Do. 4 % Deb. Stock	100	4 %	4 %	4 %	4 %	94 — 97	94 — 97	..	..	..	4 1 8
119,694	River Plate Elcty. Co. Ord. Nos. 1 to 120,507	1	..	2½%	..	..	1⅝ — 1⅞	1⅝ — 1⅞	24/6	..	..	..
100,000	Do. do. 6% Non Cum. Pref. Nos. 1 to 100,000	1	6	6	6	..	1 3/32 — 1 5/32	1 — 1⅛	21/9	21/3	+ 1/32	5 6 8
194,684	Do. do. 6% Deb. Stk. Red.	100	5	5	5	5 %	100 —108	100 —108	..	..	..	4 17 1
40,000	St. James' and Pall Mall Electric Light, Ord.	5	12½%	10 %	10 %	10 %	8⅜ — 8⅝ xd	8⅛ — 8⅜	8⅝	8¼	+ ⅛	5 14 8
20,000	Do. do. 7 % Pref. 20,021 to 40,020	5	7 %	7 %	7 %	7 %	6¾ — 7¼ xd	6¾ — 7¼	..	..	..	4 16 7
160,000	Do. do. 3½ % Deb. Stock Red.	100	3½%	3½%	3½%	3½%	86 — 90	86 — 90	..	..	..	3 17 9
12,000	Smithfield Markets Electric Supply, Ord.	5	4 %	Nil	Nil	..	1/16 — 1/8	1/16 — 1/8	..	..	..	Nil
46,700	Do. do. do. 4 % Deb. Stock	Stock	4 %	4 %	4 %	4 %	68 — 70	68 — 70	..	..	..	5 11 1
65,000	South London Electricity Supply, Ord.	4	4 %	3 %	4 %	..	2⅜ — 2⅞	2⅜ — 2⅞	..	..	..	6 10 4
120,000	South Met. Elec. Lt. & Power, Ord.	1	2½%	2½%	2½%	2½%	3/16 — 5/16	3/16 — 5/16	..	..	..	4 0 0
142,968	Do. do. 7 % Pref.	1	7 %	7 %	7 %	7 %	1⅛ — 1⅜	1⅛ — 1⅜	..	..	..	5 12 0
220,000	Do. do. 4½ % 1st Deb. Stk.	100	4½%	4½%	4½%	4½%	101—104	101 —104	..	..	..	4 6 7
80,000	Urban Electric Supply, Ord.	5	5 %	5 %	5 %	..	1 — 1	1 — 1	..	..	..	20 0 0
50,000	Do. do. 5 % Cum. Pref.	5	5 %	5 %	5 %	..	1⅞ — 2	1⅞ — 2	..	..	—1/16	12 10 0
275,000	Do. do. 4½ % 1st Mort. Db. Stk. Red.	100	4½%	4½%	4½%	4½%	77 — 81	77 — 81	..	..	..	5 11 1
808,000	Victoria Falls Power Co., Pref. Nos. 1 to 800,000	1	..	..	..	..	7/8 — 1	..	17/9	17/3	..	..
110,000	Westminster Electric Supply, Ord.	5	13 %	13 %	10 %	10 %	8⅝ — 8¾	8⅞ — 9	8⅞	8⅝	+ ⅛	5 11 1
81,279	Do. do. 4½ % Cum. Pref. Reduced from 5% since 31st Dec., 1905)	5	5 %	4½%	4½%	4½%	5⅛ — 5½	5⅛ — 5½	5⅛	5 1/16	..	4 1 10

* Unless otherwise stated, all shares are fully paid. † Quotations on Liverpool Stock Exchange. Interim Dividend.

Bank rate of Discount, 3 per cent., January 14th, 1909

THE COMPANIES' CLAUSES ACTS.

By JOS. J. H. STANSFIELD, F.C.I.S.

(*Concluded from page* 406.)

The issue of shares or stock at a discount was authorised under the Clauses Act, 1863, where powers were obtained to raise additional capital. This power of issue at a discount has not been conferred upon limited companies, although, of course, the same effect may be produced by payment of a large commission, as is now authorised under the Act of 1900.

The payment of interest upon unpaid or overdue calls can be enforced under the Clauses Act, but only at the rate allowed by law. Formerly 5 per cent. was the usual mercantile rate of interest, but there is no hard and fast rule of law that that rate is to be allowed even in mercantile cases in courts of law. It is conceived that the current rate of interest for the time being is the rate demandable by a company under the Act. The revised Table A (14), as in the case of Article 6 in the old form, fixes the rate at 5 per cent., but it is, of course, quite usual in special articles of association to increase this rate in order to ensure greater promptness in payment. On the other hand, interest may be paid on calls paid in advance, the rate of interest being limited to the current mercantile rate allowed by law, whilst under Table A greater latitude is allowed to the directors.

The forfeiture of calls even under Table A has always been a somewhat delicate operation, and one requiring great care in order to carry it out in a perfectly legal manner, but the provisions under the Clauses Act are even still more onerous. If for any reason the address of the holder is not known, delivery of the notice of forfeiture must take place by advertisement in the London or Dublin *Gazette* according to whether the company's principal place of business is in England or Ireland, and also in some newspapers circulating in the district where the principal place of business is situate. This advertisement must appear at least fifteen days before the directors pass a resolution to forfeit, and not less than two months must pass before the directors may sell or otherwise dispose of the shares, and then only after the declaration of forfeiture by the directors has been confirmed by the shareholders at a general meeting. It may happen that the shareholder will have received a share certificate, and that difficulty will be found in obtaining possession of the same, but a declaration in writing made by some person not interested in the matter and duly sworn, to the effect that the share has been properly forfeited, is a good title to the purchaser, who is not bound to see to the application of the purchase money or affected by any irregularity in the proceedings. Under the revised Table A, Article 29, a similar declaration is a good title to the possession of forfeited shares, but the declaration must be made by a director.

It may be, however, that no purchaser can be found for the share, in which case a subsequent meeting of shareholders is required to cancel the shares, a statutory declaration being again required, this time to the effect that a sum of money sufficient to pay the arrears of calls, interest and expenses due in respect of the share, could not be obtained upon the London or Dublin Exchange, or some particular exchange which may be prescribed in the special Act.

A notable point of difference between the two sets of companies is that the Clauses Act (1845) expressly allows the surrender of shares which have not been fully paid up. Surrender differs from forfeiture of shares, in that the former word connotes consent on the part of the shareholder, whilst the latter is a proceeding taken adversely to him. Neither in Table "A" nor in the Companies' Act, 1862, *et seq.*, is power to accept a surrender of shares given, although a company registered under these Acts may take power by its articles to do so, and where the power is exercised as an alternative to forfeiture, the transaction is perfectly valid, assuming, of course, that the company is in a position to forfeit. There may also be other circumstances where the power may be validly exercised, but a surrender of shares in consideration of a payment by the company would certainly not be valid, and it is, indeed, doubtful, unless the surrender is an equivalent of forfeiture, whether it would be legal unless sanctioned by the Court under the statutory provisions relating to the reduction of capital; which is its true effect. In the case of companies coming under the Clauses Acts this provision is, under certain circumstances, of considerable value and less complicatory than the onerous provisions relating to forfeiture or cancellation, requiring, as they do, the confirmation of one or more general meetings of shareholders.

It is usual in all Memorandums of Association of limited companies to take very wide powers of borrowing, though the actual amount is often limited in the Articles of Association, but borrowing in the case of companies incorporated by Special Act is restricted absolutely to borrowing in accordance with their expressly authorised powers, the Clauses Acts only giving general powers of borrowing, subject to confirmation by the Special Act. A power to borrow "on mortgage or bond" without more impliedly prohibits any other mode of borrowing; as, say, by means of Lloyd's bonds, by overdrawing a banking account, or by bill of exchange. The Legislature has deliberately limited the borrowing powers of companies of this class, and accordingly the directors of such a company are in the position of special agents, having only power to affix the seal of the company so as to bind the company when the power is expressly given to them.

One method of borrowing allowed under Part 3 of the Clauses Act, 1863, subject to incorporation by the special Act, is by the creation and issue of debenture stock. Originally the rate of interest on such stock was limited by Sec. 22 of the Act referred to to 4 per cent. per annum as a maximum, but this limitation was found to prevent the obtaining of capital, and was repealed by the Clauses Act, 1869, though it is still necessary to get a general meeting to sanction the maximum amount of interest payable. In the case of the issue of debenture stock by limited companies, it is usually provided for it to be repayable or redeemable by the company at or after a certain date, whereas in the case of debenture stock of a company incorporated under the Clauses Act, neither are the holders entitled to call in their money nor is the company entitled (except where the stock has been issued by way of collateral security only) to pay off the principal money.

It is necessary under the Companies' Clauses Act to make up the accounts of the company half-yearly, and present these to the shareholders at a meeting held in February or August in each year (or during some other month as decided by a resolution passed in general meeting). Ordinary or extraordinary meetings of shareholders must be called by advertisement 14 days before the date of meeting, but there is no requirement to send a copy of the accounts or a notice of meeting direct to shareholders. Needless to say, this latter course is generally observed, notwithstanding the non-direction.

The books are to be open to inspection for 14 days before and one month after an ordinary meeting, but the shareholders are not entitled to demand inspection of such books, except during these periods, unless in virtue of a written order signed by three of the directors.

The audit provisions under the Clauses Acts are different to those contained in the Act of 1907; for instance, two auditors must be appointed, and both must be shareholders of the company, but in the old days professional auditors were much less numerous than at the present date, and no doubt most of the companies had to rely, to some extent, upon lay inspection and audit.

Not only is the power of borrowing of companies having a special Act limited, but the application of the capital moneys has its restrictions. This must only be expended in obtaining the special Act and in carrying the purposes of the company, as expressly provided by the Act, into execution. It therefore follows that a Parliamentary company is bound by statutory obligation to make a broad line of distinction between money received on capital and on revenue accounts. A special form of accounts, making this distinction in the form generally known as the "double account" system, is also frequently required under other Acts incorporated by the

company, together with an official audit by the Board of Trade.

A quorum of shareholders at a general meeting of a company incorporated under the Clauses Act, is not always very easy to obtain. Unless otherwise prescribed, there must be present not less than 20 shareholders holding not less than one-twentieth of the capital of the company. Such a quorum is often very difficult to secure where the nominal capital is large, and proxies have usually to be obtained for each meeting. Although the quorum is high, it cannot, perhaps, be considered unduly so, as a resolution passed at a general meeting, however important, does not require the confirmation of a second meeting such as is necessary under the Companies' Act.

The Clauses Acts empower Parliamentary companies to make by-laws for the purpose of regulating the conduct of the officers and servants of the company and for providing for the due management of the affairs of the company. Penalties not exceeding £5 may be imposed for each offence, the production of the by-laws sealed by the company being sufficient warrant to allow a Justice of the Peace to enforce payment of the penalties. The company is required to publish short particulars of the several offences for which any penalty is imposed by the special Act or any by-law of the company affecting persons other than the shareholders, officers or servants of the company, and of the amount of the penalty, such particulars being affixed to a board at the principal place of business, and in some conspicuous place in the immediate neighbourhood, to which the penalties have reference. It is under similar sections in the Railways Clauses Consolidation Act, 1845 (Sec. 140 *et seq.*), that the notices of penalties imposed on railway travellers are fixed in our railway stations, a proceeding which is often objected to as unduly perpetuating the knowledge of the offence.

The winding up of a Parliamentary company is not provided for under the Companies' Clauses Acts. Under Sec. 199 of the Companies' Act, 1862, the Court has power to make an order for the compulsory winding-up of a company other than a railway company incorporated by special Act with more than seven members, but even then it is extremely doubtful whether the assets of the company can be sold without special statutory authority being obtained. Special powers and privileges given by Parliament usually affect both the general public as well as the shareholders of the company, say, for instance, in the case of a railway, water, gas, or electric power company, and such privileges are accompanied by duties and obligations which the undertakers are bound to discharge for the benefit of the public, or otherwise the company may become a general nuisance and even a common danger. Following out this view, it has been held by the Courts that as Parliament must be taken to have granted statutory powers for a special purpose to certain persons, these persons or their successors may not deal with the assets of the company except by means of and under the powers of a special Act.

A careful study of the Clauses Acts brings one to the conclusion that whilst the powers of a Parliamentary company are very carefully defined and restricted, in some ways greater latitude is given, and more direct responsibility is thrown upon the directors and officers of such a company, than can be allowed in the case of companies registered under the Companies' Acts. In some respects the working is cumbersome, and apparently unnecessary difficulties are met with when it is required to issue or obtain further capital, but most of such companies being of a more or less public character, these precautions can hardly be complained of; however, as a set off, the many returns required to be sent to the Registrar of Joint Stock Companies are not required. The preceding details must not be taken as exhausting the differences between the two sets of Acts, but it may be that enough have been given to indicate that the experience gained through the working of companies incorporating the Act of 1845 went far to give legislators confidence in 1862 to embark upon the then speculative principle of allowing companies to be formed without direct legislation and capable of easily acquiring wide powers, which has resulted in the formation of such a large number of public limited companies, in the gross employing huge sums which could not otherwise have been utilised, and providing a ready means of investment more or less remunerative.

FREE SAMPLES.

By R. BORLASE MATTHEWS, Wh. Ex., A.M.I.C.E.

A short time ago the writer was conversing with the principal of a Birmingham brass fitting firm, and was told that the "free sample" question had at one time become a serious item of expense to those connected with that special trade, particularly in connection with local bodies, such as School Boards, who would often not merely retain the samples, but also actually use them without even offering to pay the makers. Accordingly the manufacturers connected with this industry met together, and came to the conclusion that this must be put a stop to, and they accordingly agreed that no samples should be sent out without being invoiced: if the samples were returned a credit note was passed through, otherwise the full amount was collected.

It is time that something similar were done in the electrical industry, for samples which are not returned account for a considerable leakage in the course of a year. The following extract from a recent municipal tramways specification is an especially glaring instance of the extent to which the system is abused. The italics are the writer's. Attention is especially drawn to the last clause:—

"The undersigned hereby offer to supply you with all or any of the goods mentioned herein that you may require during the 12 months ending March, 1910, at the prices affixed, and subject to the following conditions and the general conditions attached hereto which we have signed. The prices quoted are strictly net, and include free delivery at any of your depôts in such quantities, and at such times as you may desire. The articles to be the very best of their kind, subject to the approval of your general manager, and to be in every respect *equal to the samples seen at your depôts and my (our) samples submitted herewith.*"

"We are willing to execute an agreement for the due and proper performance of the contract, such agreement to be prepared by the town clerk."

"*Free samples*, fully labelled with the contractor's name and address and description of material, to be delivered carriage paid at the ..... car depôt ..... at least seven days prior to the deposit of the tender."

"Sealed tenders endorsed 'tender for car accessories (mechanical), &c.' and addressed to the chairman of the Tramways Committee to be delivered at the town clerk's office, Town Hall, ..., not later than 3 p.m. on February 15th, 1909."

"*All samples submitted become the absolute property of the Tramways Committee*, and may or may not be returned as the Committee decide."

In the particular case cited above, the cost of the complete set of samples would be from £60 to £80, so that if about 12 or 18 firms tendered, the corporation would acquire a nice little addition to its stores department, without any outlay on its part. It may be smart, but it is not business. It is due to such high-handed action as this that so much opposition to municipal trading has arisen, that possibly otherwise would not have come about.

American Disregard of Life.—The *Electric Railway Journal* for December 12th, 1908, makes extracts from a report of the Public Service Commission, First District, N.Y., covering statistics for the year ending June 30th, 1907. The Commissioners' area appears to cover 763 route miles, or 1,612 track miles, over which were running 10,000 cars. The highest speed reported by any street railway was 35 M.P.H. on the Brooklyn Elevated, but the average speed was only 13 M.P.H. On the Manhattan Elevated and Subway lines the average speeds were 15 and 18 M.P.H. respectively, and on the surface (tram) lines the average speed in the denser districts was 7 to 7½ M.P.H.; in the less thickly populated parts it ran up to 9·5 M.P.H. For the entire City of New York the average speed on surface, elevated, and subway systems was 9·5 M.P.H. Notwithstanding the low average speed the cars killed 345 people, and injured 2,704. Claims and incidental legal expenses amounted to nearly a quarter of a million sterling, which is over 9 per cent. of the operating expenses, and is greater than the amount paid for fuel, is nearly equal to the maintenance of way and structures, and, in the case of the New York City Railway, is nearly equal to the wages of the conductors. There were 20·31 persons killed per 100,000,000 passengers carried. It is hardly surprising that life-guard tests are being made in America.

THE L.G.B. REPORT ON MACHINERY AND ENGINEERING STAFFS AT POOR LAW INSTITUTIONS.

The report of the Departmental Committee appointed in in October, 1907, and consisting of Messrs. A. B. Lowry, B. T. Kitchen and H. Ross Hooper, which has been investigating the question of machinery for heating, lighting, and laundry purposes in Poor Law institutions, the running of such plant and the status of the officers connected with it, has recently been published. As one would anticipate, this report contains many matters of interest; it is necessarily drawn up in somewhat general terms, and although one may agree in the main with the conclusions arrived at, certain of the latter are obviously open to question.

The asylum engineer is in many cases very much in the position of the marine engineer; his establishment has to be self-contained, and whatever he may attempt in the matter of elaborate records, tests, &c., his attention must mainly be given to the successful operation of the plant. For this reason, and notwithstanding the value of minute records, we rather question the practicability of the seventeen daily, weekly and quarterly returns which the Committee suggest should receive the attention of the engineer-in-charge, as something of a simpler character might meet the case and would have far more chance of being carried out. The Committee are certainly to be congratulated on having emphasised the astonishing scarcity of records in such institutions, and some system of record keeping is a necessity if the ratepayers are to receive value for their money.

The Committee's observations on lighting are interesting. They say :—

> The number of institutions where gas is produced on the premises is small; those where electricity is generated are more numerous; but, as a rule, light is obtained from a public supply.
>
> Electric lighting is generally considered to have advantages over gas lighting for institutions, but a saving in cost for illuminating purposes alone is not usually counted among those advantages. Evidence was, however, submitted to the Committee of economies effected in cost of lighting by the substitution of electricity for gas. It was not contended that, light for light, electricity was cheaper. The saving was attributed to the readier facilities for controlling the use of electricity.
>
> It appears to the Committee, however, that much more care can be exercised in controlling the consumption of gas than is at present often the case, and that sufficient advantage has not been taken of the opportunities of economising by the use of incandescent mantles. On the whole, it does not seem to them that there is adequate evidence to justify the substitution of electricity for gas at institutions where gas is already in use. At new institutions the question is more open and depends largely on local conditions.
>
> Where electricity is installed, consideration should be given to the use of metallic-filament lamps, which consume much less current in proportion to the light given than carbon-filament lamps.

Needless to add, we think that the weight of evidence has been largely in favour of using the electric light in such institutions, not merely because of the saving due to the facility of control, to which may be added, although it is not mentioned, the lessened expense of maintaining the decorations, but on hygienic grounds, which must surely count for something in asylums and infirmaries, if anywhere.

It is, moreover, somewhat difficult to estimate the possible economy of installing metallic-filament lamps when no records of the cost of energy are available.

The investigations of the Committee have led them to conclude that when electricity can be obtained at a reasonable rate outside, it is not advisable to produce it inside; they go on to suggest that in many cases the plant installed is excessive, quoting certain instances of plant installed and *average maximum loads*, in support. What is the average maximum load? Judging from the figures given, to take one case, 115 KW. installed, and 17·5 KW. average maximum load, we can only conclude that the Committee have not obtained the highest load recorded, by which alone the suitability of the plant installed can be gauged.

Incidentally the Committee advocate the use of a steam engine in the laundry on the ground of economy, seeing "that live steam has to be brought to the laundry for washing purposes." But why not drive with electric motors seeing that where electric lighting is employed, electric mains have to be run into the building, and that small steam engines are proverbially steam eaters, more costly to operate and to keep in good order than electric motors?

On the question of staff, it is pointed out that the engineer-in-charge is generally in "close subordination" to the head of the institution; that he bears to some extent the inferiority of position, which was the portion of his less skilled predecessor in the days when engineering plant was scarce.

The engineer-in-charge at a large institution is necessarily a skilled technical man with considerable administrative ability, having a numerous staff under him, and it is therefore not surprising that strong representations were received from the Amalgamated Society of Engineers and the Association of Engineers-in-Charge, "that engineers are not given sufficient control of their departments, and that frequently they are subjected to unnecessary interference from superior officers."

The Committee evidently sympathise with the attitude of the societies, as they consider "that in large institutions at least—in small institutions the conditions are different—fuller control and responsibility should be given to the engineer-in-charge than is now generally the case," this applying as regards their staff, stores, &c.

There is one section of the Report with which all engineers will cordially agree, viz., that relating to new buildings, &c. The Report states :—

> When a new building is to be erected, it appears to have been the general practice of Guardians to place the engineering as well as the building work in the hands of the architect, leaving it to him to employ a consulting engineer if he thought necessary. Evidence was received by the Committee in support of this practice.
>
> It does not appear to the Committee, however, that there is any essential reason why an architect should be solely engaged. On the whole, it seems preferable that, where the engineering work is of an important character, a consulting engineer should be employed directly for the work.
>
> He should be engaged jointly with the architect from the inception of the scheme, and should work in conjunction with him.

In a large installation, where heating, lighting, ventilating, pumping, laundry and steam and electrical machinery find a place, it is certainly passing strange that the architect should say the final word, and not only this, but draw the fees for carrying out schemes the suitability of which he can only gather from the views of the individual contractors.

Such procedure is, of course, not by any means confined to Poor Law institutions, and it may probably be held accountable for the unsuitable arrangements which the Committee have found occasion to criticise, and to which, indirectly—through the non-provision of means for obtaining same—the absence of works records may be traced.

We have previously referred to the question of records, which, the report states, should embrace returns of fuel, gas, electricity, water and stores used, of steam raised, of wages and repairs, of laundry work, and, as far as possible, of the cost of the several engineering services, including cost of generating electricity, or producing gas, and of obtaining water. The 22 schedules attached are apparently intended for "institutions with extensive plant." No one will question the value of keeping a systematic check on the working of engineering plant, even on a small scale, and we wish the Committee had indicated a minimum requirement for small installations. In this connection, we think the value of the report, dealing, as it does, with the running of plant, would have been much enhanced had a practical central station engineer been included among the signatories.

The investigations of the Committee satisfy them that many defects which have come to their notice are such as could be prevented or remedied by systematic central supervision.

With this end in view, they consider that periodical returns should be obtained by the Local Government Board, and that a fully-qualified engineering inspector should be appointed to assist the Board in dealing with engineering matters at Poor Law institutions.

The inspector would give advice on engineering proposals, supervise matters through the periodical returns, and report annually to the Board.

We trust that the Committee's recommendations, and especially the last mentioned, will receive due attention.

SMOKE ABATEMENT: A SHEFFIELD EXHIBITION.

[FROM OUR OWN CORRESPONDENT.]

(*Concluded from page* 379.)

Among the most interesting exhibits was that of Messrs. Siemens Bros. & Co., Ltd., of Sheffield. On a huge stand in the centre of the hall they show an interesting selection of electrical appliances. They make a special feature of pyrometers of various descriptions, and considerable interest has been taken in a pyrometer for registering and recording on one instrument the temperatures of five different steel or iron furnaces, the instrument giving a continuous record. By this means the engineer in his office has a check on all five furnaces at whatever distant part of the works they may be situated. Examples are also shown of portable optical pyrometers, water pyrometers, and various standard types of pyrometer sheathings. There is an exhibit of an automatic lift controller for use with two-phase, three-phase, or direct-current motors.

The Union Electric Co., Ltd., are lighting the exhibition both inside and out with their "Excello" arc lamps. They also show a number of D.C. dynamos and motors, polyphase motors, high and low tension switchgear, and measuring instruments.

The Sheffield Corporation Electric Supply department's stand is lighted generally by metallic-filament lamps, several makes being well represented. There is also a good display of the "Radiant" electric stoves. The department has taken advantage of the opportunity given by a firm of house furnishers to fit up a dining room and bedroom, and thus give a practical object lesson in lighting and warming living rooms to the best advantage by means of electricity. All through the exhibition electricity makes a bold bid for adoption, alike on the grounds of cleanliness, efficiency and economy, for the many practical purposes of everyday life and industry.

Messrs. Ibbotson Bros., of the Globe Works, Sheffield, show Talbot's patent air purifier at work in various forms. The apparatus is a steam or electrically-driven fan, which draws atmospheric air in a duct into a closed casing, and scrubs it clean from all solid and some gaseous impurities by means of water broken up into a fine spray by gauze mounted on the periphery of the fan. In falling the water carries away the impurities from the air and leaves it revivified and invigorating.

Other exhibits represent most of the important methods of preventing pollution of the atmosphere by smoke, this object being achieved by various scientific ways of stoking, and by the use of patent fuels for domestic purposes in place of the ordinary coal or coke fire.

A conference of manufacturers to consider the question of smoke abatement was held on Wednesday, March 3rd, under the presidency of Sir John E. Bingham. Some 250 invitations had been issued, but the attendance was somewhat disappointing, not more than fifty responding. The papers led to keen discussion.

The Chairman, referring to the smoke emitted from chimneys other than factory chimneys, said he would like to see incorporated in the Act of 1875 the power to deal with domestic chimneys, some of which, he said—those which appertained to public buildings—they might call furnaces. Sir John suggested the institution of a Smoke Abatement Department in connection with the Board of Trade and the adoption of educational methods for the benefit of manufacturing firms generally. He laid stress on the important part which proper stoking plays in the prevention of smoke, and stated that re-heating furnaces, which produced 60 per cent. of the black smoke created, could be corrected by the use of gas, and the admission of air at the proper moment without injury to the furnace. He admitted that there was a greater difficulty with regard to annealing furnaces, but with care the smoke could be very greatly reduced in their case also.

Mr. T. Scott Anderson (Sheffield) delivered a paper on "Smoke and its Possible Destruction." He said an enormous amount of energy was daily wasted by the use of inefficient apparatus for the proper consumption of fuel. Some of it might be excusable, but there could be no question that a large amount could be, and should be, prevented. Dealing with the question of factory and furnace smoke, he said a boiler, to be a perfect apparatus, should utilise the whole of the energy of combustion. But, unfortunately, there was no perfect boiler. A boiler as an economical apparatus left very much indeed to be desired. Two remedies to be sought were a better consumption of fuel and a proper regulation of the air supply. The reader of the paper presented as a valuable principle the utilisation of producer gas as an auxiliary fuel to the ordinary small bituminous coal. The tests of the particular apparatus employed had so far, he said, been highly satisfactory. With regard to metallurgical furnaces, he reminded the conference of Sir Oliver Lodge's remark a day or two before, that they must look to high radiation to obtain the ideal heating of cold surfaces, and expressed the hope that this would help to dispose of the idea that a smoky flame was essential to certain metallurgical operations. With regard to the evil of house fires, so long as they employed bituminous coal in open fires so long must they have smoke. No doubt the problem could be solved, but the question was, could it be solved so as to allow the solution to be within the reach of people in houses worth a few shillings a week? The two remedies which he offered were the general use of a cheap and efficient gas (such as Sir Oliver Lodge had mentioned), and secondly, coalite, which he hoped would soon be available at a reasonable price for all coal fires.

Mr. W. H. Booth (London) gave a paper on "Stoking, Mechanical and Otherwise," and in this connection laid stress on the importance of the conservation of temperature. The stoker, he said, was one of the worst paid men in the country, seeing that he had in his hands the power of wasting or saving a great quantity of coal. He spoke of the efforts made in London to teach stokers something of the principles of their "art," and suggested lectures on the same lines in Sheffield. At the same time he pointed out that no stoker could do his work well unless he had proper appliances. He singled out incidentally electric light stations as the worse offenders in regard to the smoke nuisance. It was claimed, he said, that electric light made for sweetness and light. It did in a way, he admitted. "But I believe," he added, "electric light stations are the worst sinners that we have amongst us. They pay very little attention to combustion. In fact, I do not think they care about it." He thought the electric light people should be approached and every endeavour made to bring them into line with other factories.

Mr. John B. C. Kershaw, F.I.C., of London, gave an interesting account of the work of the Hamburg Manufacturers' Smoke Abatement Society. The society, he said, was inaugurated in October, 1902, by a few engineers and manufacturers who believed it was possible to obtain more steam and less smoke from their steam-raising plant by scientific control, and had the courage and independence to form this voluntary association, instead of waiting for some outside body of persons or authority to step in and show them their duty in the matter. The society had grown each year since its formation, and commencing with 48 members owning boilers in 1903, at the date of the last annual report it numbered 258 members and had 717 steam boilers under its control. The technical and scientific supervision is undertaken by a staff of chemical engineers, retained by the society for this special work. Mr. Kershaw's two leading points were the proper supervision of furnaces and boilers by chemical engineers, and the employment of properly trained stokers for firing the heating appliances. Under the management of the society mentioned regular examinations and tests were carried out by its officers, and practical instructions given in stoking by instructor-stokers.

Mr. Victor Stobie (Sheffield), in the short discussion which followed, speaking from the metallurgical point of view with regard to reheating furnaces, asserted that if they once produced black smoke they could not then consume it. What they must do was not to produce it at all. They must either admit a great excess of the air at the part where the coal was, or gasify their material and then burn it. Instead of complaining that the manufacturers did not do the best they could with their furnaces, it would be more useful to try to convince them that furnaces could be improved by the substitution of gas firing.

Mr. Albert Senior (Sheffield) said there was no manufacturer who was not anxious to do away with black smoke. But in reheating furnaces, experiments proved that one dared not work on ordinary gas-firing; though, as for the cheaper steels, they could be put into a hot fire, and there was no reason why black smoke should be made in regard to them. He was convinced that the only way to avoid black smoke entirely in boiler chimneys was by mechanical firing.

Mr. Scott Anderson and Dr. Markel (Warrington) both combated the suggestion that the smoke could not be consumed after production in the circumstances mentioned by Mr. Victor Stobie.

PROCEEDINGS OF INSTITUTIONS.

The Wiring of Buildings.

By Donald Smeaton Munro, A.M.I.E.E.

(*Abstract of paper read before the* Institution of Electrical Engineers *at Glasgow, January 12th*, 1909.)

No really good and cheap method of indoor wiring has yet been invented; the problem of wiring yet remains unsolved, and is worthy of the attention and effort of the best men in this Institution.

The employment of wood casing for carrying electrical wires has to-day a few friends and many enemies. Wood casing can, in almost all cases, be fitted in a manner which is inoffensive. It gives a high insulation test, and cables removed from wood casing after 20 years appear as good as when originally fitted—a fact due partly to the high quality of early cables. Wood casing also permits of easy inspection of wires, and lends itself to additions and alterations without disturbing the floors and skirtings of rooms above.

The chief defect of casing is that damp with acids from concretes &c., if unnoticed, may so saturate the wood that leakage and electrolytic corrosion will affect the copper and its coverings, and fire occur. Yet there are fewer fires with wood casing than with most other systems of protection for electrical conductors.

But how is it that small cables, even of C.M.A. 2,500 meg. grade, break down so rapidly and inevitably when a little damp gets about them? Apparently the burden of preserving the insulation rests upon the casing or conduit to an extent greater than one would anticipate with wires cased in tubes of good solid rubber.

Sometimes casing is embedded in plaster, finishing flush with the surface—the capping alone projecting and being made wide enough

to cover the joint. If this be done the casing must be well varnished in and out, back and front, before fitting, and be left open until the plaster is quite dry.

Much time lost on wiring jobs would be saved if apprentice wiremen could be given a year at least under tuition of a good carpenter at all sorts of relative woodwork on buildings. To this Trade Union rules are the chief obstacle.

It is often useful to form cable casings in dado rails and picture or cornice mouldings. With plain or special casing thus carried round walls and fitted with plug sockets at intervals, one is at a loss sometimes as to the best method of getting from the casing to central roof-points or brackets. A quite neat arrangement is to loop boldly out or down from the sockets on wall casing with "flexible" of colours to suit the rooms. These lend themselves so easily to alterations of position that they are specially useful in offices.

In crossing cornices or other plaster mouldings of which the shape does not permit the casing to be fitted on surface, or partly within or wholly behind them, the plan has been tried of cutting away a short section of moulding, and reforming it with grooves of special plaster behind. Again, a carefully designed metal conduit bracket, white painted or otherwise treated to suit, has been adopted as a cornice crossing.

The more usual method is to terminate the casing on either side of the plaster moulding, and connect by a concealed tube. These short lengths of connecting tube are few and short on a well-planned job. When they are of metal, usually compo or zinc, it is necessary, when installing, to test that they are free from contact with other pipes or structural metal. They are better not "earthed."

The early method of carrying wires on china insulators has developed into the "Continental" system of lighting by means of flexible wires spirally twisted together and fastened to walls and ceilings by means of small stud or ring insulators. In this system the mains and sub-mains are generally of ordinary V.I.R., taped and braided cable, led in thin brass tubing with insulated lining, or in wood casing. The sub-circuits are entirely exposed as described, except where wires pass through walls or ceilings, where tubes are introduced. The wires are so small that their presence is not unduly obtrusive. This is especially the case if the braiding is coloured to suit the walls. Joints should in almost all cases be made in tiny china terminal cases or hollow studs. This is, perhaps, the cheapest of all systems to install, as the accessories required are few and simple, and the time required for erection little. Where the voltage is low and temperatures are equable, it seems to stand wonderfully well, although five years may be counted about the average life. It is strongly advocated by some who profess to see in it the whole salvation of the electrical industry. While there are circumstances where it may be used with advantage, the writer considers that its general adoption would ultimately prove harmful. This system has a powerful supporter in Prof. Schwartz, whose historic paper on "Flexibles" showed that common flexible would withstand an astonishing amount of ill-treatment. Most engineers, however, who have to be responsible for the satisfactory working of an installation do not care to rely entirely on what is, after all, the weakest class of cable used on ordinary building work. In a small villa of 36 lights wired a year ago, and allowed to stand vacant for six months with a number of plain cord pendants in position, the writer found that the flexible had absorbed enough moisture to bring the insulation test down to 0·25 megohm. When the pendants were rewired with flex from the original coil the resistance rose to 3 megohms. If we except lamps and holders, there is no part of an ordinary casing or conduit installation which gives more trouble than the flexible part of it. The close proximity of the two conductors in itself hastens the disintegration of the rubber, and heating at holders and switches is a fruitful source of trouble. Dust is deposited on neighbouring surfaces, and flexible free in air is liable to continue burning when an accidental short takes place. It is difficult to bare the ends of flexibles without severing some of the strands, and to obviate this the writer has used braided flexible. This also prevents the risk of escaping strands "shorting" to wrong terminals, and affords a better grip for the binding screws. He also finds concentric flexible a help to keep down dust deposits, the live wires being inside; but this sort of flexible is difficult to treat satisfactorily at terminal points. Wood casing, flexible, and enamelled wiring may be said to belong to the insulated system. Rarely used, but belonging to the same class, are asphaltic paper tubing and circular loom conduit. All other wiring systems are of the metallic type.

The idea of carrying the outer metal sheath throughout the installation, and utilising it at the same time as a conductor and a mechanical protection, was patented by the writer's father in 1883. Where an installation is fed from a private source the concentric system may still be used. But few supply companies having an earthed mid. will connect to an installation wired in the concentric style, as there is likelihood of "earth" complications.

Lead-covered wires, both single and multiple, are the right things to use in many situations, chiefly in parts of ships and mines, or where exposed to steam, as in factories, and on the outside of buildings where the heavy tube is inadvisable. In such places no form of covering is expected to last very long.

At first sight it would seem that lead-covered cables would form an ideal method for the general interior wiring of buildings. The writer's experience has, perhaps, been specially unfortunate, but no other, even among the early systems, has proved so troublesome as lead-covered cables. The faults may take years to develop, but then they usually come thick and fast.

Careful wiremen are wanted for all systems, but experts are required to deal with lead-covered wires. It is difficult to avoid blow-holes when sealing up lead joint-boxes, and to avoid roasting the interior joints. These defects are got over by the Key Engineering Co., who make cast water-tight boxes fitted with block-joint terminals, and having brass clamping glands which grip the sheath and so make soldering unnecessary.

In some situations where dry rot or ammonia helps the formation of lead acetate, the covering gradually crumbles entirely away. The chemical action must be somewhat complicated, as the rubber, and even the copper, is affected in such cases, and becomes quite brittle. Some of the faults are due to the manufacture. This type of wire, on the other hand, is free from internal condensation troubles, is easily led throughout a building with less cutting up than steel conduit, and is less in evidence than wood casing.

Heavy brass and copper tubing were early tried, but unless they are utilised as conductors, such metals are too expensive to be commercially practicable. Some engineers now use light brass conduit for general housework. It is of small bulk and easily run behind strapping and plaster, and it is not unsightly if run on the surface. A zinc tube has the merit of being difficult to corrode, and it keeps the rubber cables in good condition.

Gas-barrel was first used in exposed places, and later for general work. When carefully rimered, it has some advantages over the steel tube now in common use. Wrought-iron does not begin to rust so soon as the special steel used for conduits, and the action does not spread so rapidly. Hitherto it has been difficult to get absolute uniformity in the gauge of wrought-iron tubes; but the writer is told that it will shortly be possible to obtain solid-drawn wrought-iron conduit of small size. Such tube would not, of course, require to be rodded, and in other ways it would seem to have qualities likely to prove exceedingly useful for the wiring of buildings.

Thin steel split enamelled conduit appealed in the first place by reason of its smart appearance, smooth surface, and low cost as compared with gas barrel.

This class of tube is too light to carry a thread, and the couplings are necessarily of sleeve form. These allow of very quick erection, and the system is useful in places where voltage is low and electrical continuity of little importance. The tube is not suitable for burying in cement or plaster, however, and when laid beneath a floor must be well out of reach of possible nails.

With the object of obtaining electrical continuity while retaining the advantages of unscrewed conduit, many forms of coupling have been brought out. The writer found that a perfectly continuous installation could be made, even dispensing with screws or wedges, if a carefully fitted pair of male and female rimers, suitably tapered, were used for all tube ends and couplings.

A light class of steel conduit with unscrewed coupling has been lately put on the market by the Key Engineering Co. The lengths of conduit are in the form of semicircular troughs, with covers which may be clipped on after the cables are in position.

Screwed steel conduit is generally supplied stove enamelled to the contracter. The Standards Committee states that the screwed ends must be free from enamel; the couplings do not always cover the screws, so there are many places left open to the action of rust. After the conduit is in position it should, therefore, be gone over carefully and these weak places painted.

The most popular form of screwed conduit is the welded class, which is cheaper than other forms. Some makers are very careless in respect of examining and clearing the bore, and occasionally it is necessary to disturb the paint, paper, and plaster to remove a choked-up length which prevents the drawing-in of cables. Workmen are not always as careful as they ought to be in examining the interior of tube lengths before fitting.

There is an infinite variety of patterns in the joint, draw, and terminal boxes for use with steel conduit. These are generally malleable castings, and constitute a not inconsiderable item in the cost of an installation. Many of the joint boxes are much too small for their purpose, and it is impossible to get enough slack wire to enable the joint to be pulled out to be soldered properly.

Many of the boxes are used to contain china connectors, which reduce the time required to make connections, and facilitate testing separate lengths of wire. Their use, unfortunately, tends to reduce the insulation resistance owing to surface leakage across the china surfaces, and the screwed connections are troublesome. If concealed joint boxes are made roomy and with well-planned insulation and strong screws and lock nuts, all well tinned, they serve their purpose very well.

Terminal joint boxes are particularly useful on circuits where all the lights and switches are more or less confined to a small area.

After the positions of all outlet points, fuseboards, main switches, &c., have been determined on the building, it is generally best to make a plan on which such points are clearly marked. The author uses a rubber stamp consisting of a brass handle fitted spring tight to a 3-in. diameter disk of hardwood; round the edge of the disk is fixed a strip of rubber having 12 symbols cut to represent the more common sort of outlet, as electrolier, pendant, bracket, wall socket, switches, &c. In conjunction with this is used an ordinary rubber stamp carrying the 12 symbols and their interpretations. A plan should also be prepared showing the lay-out of circuits and the positions of junction and draw boxes.

Some engineers appear to consider that the fewer lamps per branch circuit the better the job, and that the ideal installation would be one lamp one fuse, or pair of fuses. The result is a great increase in the length of conduit and wiring, more cable to maintain, more risk of breakdown, and more cutting-up of flooring joists, &c. In one place where one lamp per circuit was specified on a wood-casing installation, the contractor had to point out that all the available wall space would not suffice to contain the necessary casing. The three-ampere limit of the Institution Rules is a good

maximum for ordinary buildings, although with small and highly efficient lamps it will often be found convenient to reduce the number to 8 or 10 lamps or thereby. There are many buildings where a larger current per branch-fuse is often advisable.

There seems no need for the extravagant wholesale adoption of the looping system and the entire abolition of insulated joints. Where looping is employed extensively, it means a considerable addition to the amount of cable required and to the number or size of conduits.

There are distinct advantages to be gained by so fitting the tubes that they are moderately well insulated from "earth." When this is done it is possible to test the continuity of all tubes, and to test also their freedom from contact with other metal. It is a good plan to have a battery and bell in circuit during erection, so that workmen are at once warned when any such contact occurs, also of any serious injury to their wires and cables by other tradesmen; to facilitate these tests there ought to be a sealed disconnecting box in the earthing wire. If Mr. Lackie's suggestion of a resistance in the earth wire is to be used, such a box would be a convenient point for its connection.

Except in concentric work, metal fittings are perhaps better, on the whole, insulated from earth.

Switches ought not to be fitted where the user would be apt to touch earthed metal with his free hand or foot while using the switch.

Tests between outer and mid, or positive and negative, ought to be made and recorded with the same care as that between cables and earth. Insulation tests are usually only tests of the surface leakage on switch, fuse, plug and holder surfaces, and a good or bad test is more a test of the dampness of the building than of the quality of the work, yet much may be done to improve the test by attention to details and to the proper treatment of coverings at cable ends. All buildings ought to be tested at least once a year and the records kept for comparison.

That electrical fires do occur is well known. In a large city, having some 17,000 consumers of electricity, the causes of fire were found to be somewhat as follows:—

Electrical Fires Due to Contact with Gas Pipe.

	Conduit.	Casing.	Lead covered.	Flexible cords.
1902	3	0	0	0
1903	4	0	3	0
1904	3	0	3	0
1905	0	1	2	0
1906	2	1	2	0
1907	5	0	2	1
1908	3	0	0	1

In the foregoing, of the gas-pipe fires with casing, one was caused by a nail driven through wall-casing and gas pipe, the other by a gas pipe lying on wet casing in a basement. The remaining fires due to wiring during the foregoing period of seven years or thereby were:—

In conduit systems	2 to dead short between mains in separate tubes.
	3 to abrasion or damp at tube outlets.
Lead covered	1 to corrosion by chemical action.
Wood casing	4 to water getting on to underfloor casing.
	1 to damp wall of cellar.
Flexible ...	1 to short-circuits by staple.
	3 to short where flexible joined holder.
	1 due to tying flexible in knots.

All the remaining electrical fires were due not to wiring, but to accessories, such as resistance coils, main and branch switches, lamps in contact with inflammable material, broken arc globes.

In the foregoing list, lead-covered wire fires are much more numerous than they ought to be, considering the small proportion of wiring done on this system. One of the chief advantages of lead-covered wiring is that it can be pulled in with less opening up of building structure, but these fire figures suggest that this is not an unmixed benefit.

Wood-casing shows up well; it would, indeed, be the safest of all systems if not fitted in wet places, at least without special precautions, and if kept wholly within sight.

Of the conduit fires sixteen were in slip-joint systems, and the remainder in screwed conduit. No data are obtainable as to the proper earthing of these screwed tubes, but as a matter of fact, if they are in direct or indirect contact with gas pipe, earthing makes little difference in fire risk.

In view of these and other well-known figures, it will be admitted that the fire risks of electrical wiring are small. To the practical electrican who knows the enormous amount of cheap and bad work done, the paucity of electrical fires is a constant wonder.

If thoroughly well done, there is little difference in cost between conduit and casing, but in rougher work there are more things in casing which can be cheapened or omitted without challenge. Lead-cased wires are cheaply fitted, and they have their advocates.

The current prices obtainable for wiring are hopelessly inadequate to provide for the best class of work. The very best conduit work cannot meantime be done at a cost of less than 20s. per light-point for branch tubing and wiring only, including outlet boxes. In some cases 30s. would do little more than cover cost. Yet carefully specified work is taken every day at 10s. per point, and often for much less.

It is quite possible that there will be a return to lower consuming voltages coincident with the development of high-tension transmission. With pressures of 25 to 100 volts the wiring precautions can be very materially reduced, and cheap methods of wiring would have a fair chance notwithstanding the increased size of indoor cables. The increased efficiency of lamps helps this.

Whether present pressures be changed or not, there is a demand for a cheaper system of wiring.

Iron or steel conduit has not much in its favour. If wiring must be concealed, what is wanted for branch wires is cable, with its metallic protection complete, manufactured in long lengths and delivered in coils, and soft enough to unwind, bend, and straighten easily.

Whether or not we can get a conduit cable suited for pulling in anywhere, or of being carried out and in over varying surfaces, it would certainly be a convenience if architects in designing buildings would provide better paths for electrical conductors. Many of the new fireproof buildings are planned as if to make the running of wires or pipes impossible. Surface twin-flexible, made concentric to avoid dust troubles, is worthy of extensive trial in many places.

Discussion.

Mr. J. R. Mackenzie remarked that the subject of wiring had not received from the Institution that consideration which it deserved. A system which was good for one place might be bad for another. He thought they could get a cable which would be sufficiently reliable without having an insulation resistance of 2,500 megohms.

Prof. Baily agreed that wiring had been neglected, with the result that it was the weakest and most inefficient part of the profession at the present time. The conclusion he drew from the whole paper was that what was wanted was a new cable. Nearly all the breakdowns arose from faults in the rubber covering of the cable as it came from the makers. The only safe place to put rubber was in wood casing. Lead-covered cable did not last at all in wood casing, in his experience. They could not trust rubber to insulate. What they wanted was another insulating substance which they *could* trust, if installations were to cease to be a constant source of alarm. Rubber had all the qualities necessary for a good insulator except durability.

Mr. W. M'Whirter said he had seen pure rubber in a better condition after being in for 20 years than vulcanised rubber installed for only a short time. His experience with lead-covered cables had been unsatisfactory.

Mr. Wilson said that troubles with rubber were largely due to cables being run in tubing in which there was condensation, giving rise to rust, which damaged the rubber. The ideal cable was the twin paper-insulated cable.

Mr. Preece said it seemed to him that what was wanted was a cable which, in spite of bad workmanship, would make an installation a success. Rubber insulation for house wiring was the best material at the moment. Defects in tube-cased cable were often caused by the workmen pulling the wire instead of pushing it through. Lead-covered cable was, to his mind, the nearest approach to the ideal.

Mr. S. L. Peach said there was a class of premises where appearances were of little consequence, and where the cost of wiring was the only reason for electricity being kept out. For such places a system of wiring (not flexible) run upon porcelain cleats or insulators could quite safely and cheaply be carried out. More trouble was caused through carelessness and bad handling of cables, tubes, &c., than through defective material. The advocates of an earthed outer for house wiring did not seem to realise the difficulty encountered in keeping the middle wire everywhere at or very near earth potential.

The Chairman (Mr. W. W. Lackie) thought that a cheap standard of wiring would lower the standing of the workman, and would be detrimental to the electrical industry. During the six years, 1902 to 1908, 61 fires occurred in Glasgow due to defective electric wiring; ten of these were traceable to bad flexibles. He was afraid that cheap surface wiring would increase the number of these fires, and would deter possible consumers from the use of electrical energy. He thought, however, a compromise could be arrived at. He would advocate wiring in a substantial and good manner to sockets or portable connections on picture mouldings or skirting boards, with flexible carried out to the lighting points. It would then be a simple matter to remove the plugs and portable connections, together with the fittings when the rooms were being done up. In the wiring of tenements, he thought the wiring of each flat should be carried out under its own floor, taking the wires up past the switches and on to the ceiling. If the wiring was stopped at a ceiling rose or socket on the picture moulding, flexibles could be festooned to the centre light.

Mr. Munro, in his reply, advocated a uniform standard in rubber mixture. He considered that there were numerous disadvantages in the use of lead-covered cable, and his opinion was that that was the general experience.

Fly-wheel Load Equalisers.

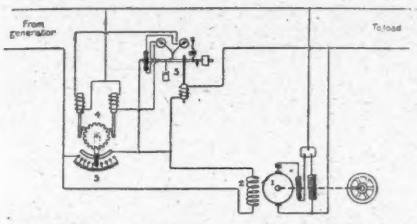
By J. S. Peck, M.I.E.E.

(*Abstract of paper read before the* Institution of Electrical Engineers *at Manchester, February 23rd*, 1909.)

For certain conditions of service the storage battery is admirably adapted; it can be used to carry peak loads of several hours' duration, but only a very small percentage of its total stored energy can be given out in a few seconds' time. On the other hand, a fly-wheel can be brought up to speed in a few seconds, and may be made to give up its stored energy as quickly; but the amount of energy that can be stored in even a large fly-wheel is compara-

tively small,* and the fly-wheel equaliser is suitable only where the load fluctuations are extreme and of very short duration.

The fly-wheel load equaliser consists essentially of an electrical machine coupled to a fly-wheel, the electrical machine being arranged to act as a motor and speed up the fly-wheel when the load on the system is below a certain value, and to act as a generator, slowing down the fly-wheel and returning power to the system, when the load exceeds a certain value. This definition



1, Fly-wheel machine; 2, Special series winding; 3, Shunt resistance for 2; 4, Solenoid-operated regulator; 5, Automatic controller for 4.

Fig. 1.—Lancashire Dynamo and Motor Co.'s Equaliser System.

does not cover the Ilgner and similar systems, which do not return energy to the mains. The D.C. machine is the most suitable for this work, as by variation of its field strength it can be made to act either as generator or motor over a wide range of speed, and it is, therefore, used even on A.C. systems, the A.C. being converted to D.C. for the purpose.

One of the simplest forms of D.C. load equaliser is that made by the Lancashire Dynamo and Motor Co. (Kelsall & Warburton patents). It consists of a D.C. machine coupled to a fly-wheel, and an automatic regulator adjusted to keep a constant output on the mains. The machine has a shunt winding, a series winding to overcome the armature drop, and a winding in series with the circuit on which the load is to be equalised, this winding being shunted by a resistance controlled by the regulator. The fly-wheels are run at a peripheral speed as high as 25,000 ft. per minute, and a maximum speed variation of 30 per cent. is allowed,

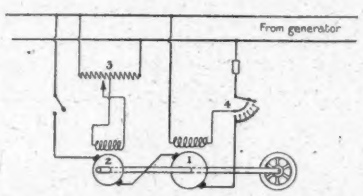
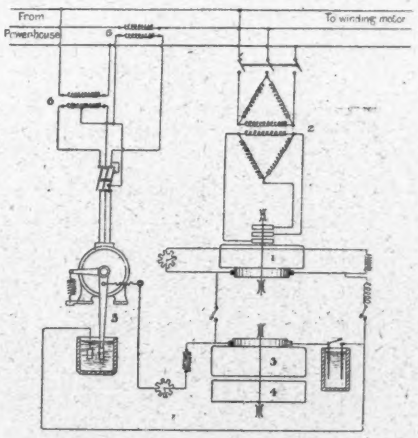


Fig. 2.—Lahmeyer D.C. Fly-Wheel Equaliser.

permitting about 50 per cent. of the energy of the fly-wheel to be utilised. Commutating poles are necessary to prevent sparking, and the machine is larger than the ordinary size, as it has to give full voltage at 30 per cent. below maximum speed. The overall efficiency should be well over 80 per cent. The connections are shown in fig. 1.



1, Rotary converter; 2, Transformers; 3, Fly-wheel machine; 4, Fly-wheel; 5, Automatic regulator; 6, Transformers for controlling 5.

Fig. 3.—British Westinghouse Rotary Converter Equaliser.

The Lahmeyer Co. employs two D.C. machines coupled to a fly-wheel (fig. 2). The larger machine, 1, works with constant field, the smaller, 2, with variable field controlled by an automatic reversing regulator 3; 4 is a starting rheostat. The auxiliary machine has about 15 per cent. of the capacity of the larger, and is used in opposition to the large machine at maximum speed; as the load comes on the regulator reduces the voltage of 2, so that 1 begins to generate, and as the speed falls the voltage of 2 is gradually lowered to zero, reversed, and brought up to full value in the opposite direction, assisting 1.

For A.C. systems, either conversion to D.C. is employed, or an A.C. machine is direct-coupled to the fly-wheel. The British Westinghouse rotary converter equaliser was first suggested by Mr. Rudolf Braun. A 500-H.P. equaliser has been in very successful operation for several months at the maritime pit of the Great Western Colliery Co. in South Wales. The arrangement is shown diagrammatically in fig. 3. 1 is the rotary converter, 2 the three-phase transformer supplying it, 3 the direct-current machine, 4 the fly-wheel, and 5 the automatic regulator. When the load on the mains is light, the

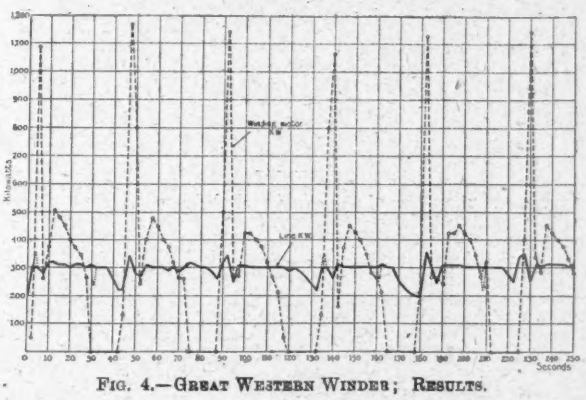
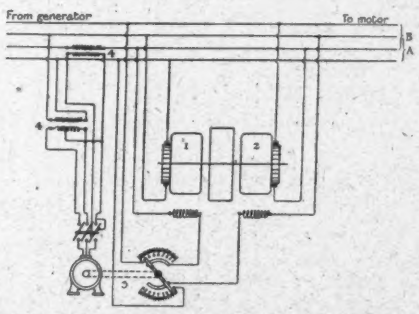


Fig. 4.—Great Western Winder; Results.

field of 3 is weakened, and the fly-wheel speeds up; when the load is heavy, the field of 3 is strengthened, and energy is returned to the line through 1.

The rotary is provided with both series and shunt windings, which act in opposition when energy is being stored in the fly-wheel, and in conjunction when energy is being given out. The shunt field being made rather strong, the rotary works at about unity power factor when generating D.C., and with a leading power factor when generating A.C, thus tending to compensate for the wattless current taken by the load.

The fly-wheel machine is shunt-wound, with a liquid resistance in the circuit, actuated by a small induction motor, which is fed from current and pressure transformers in such a way that a reversal in the flow of energy reverses the torque on the motor and prevents the equaliser from supplying current to the generating station. The equalising results, as shown in fig. 4, are excellent. The winding motor input varies from over 1,100 KW. to zero, while the



1 and 2, Single-phase fly-wheel machines; 3, Automatic regulator; 4, Transformers.

Fig. 5.—Single-phase Commutator Machine Equaliser.

maximum output from the line is about 350 KW., and the average 294 KW. Either of the fly-wheel equalisers previously described could be used as the D.C. set for this system.

The winding motor is of the three-phase slip-ring induction type, giving 700 H.P. at 2,200 volts, 25 cycles per second. The rotary converter is rated at 400 KW, six-phase, 550 volts, and the fly-wheel generator at 350 KW., 750-500 R.P.M. The fly-wheel weighs 22,000 lb., and measures 6 ft. 1 in. diameter × 3 ft. 6 in. wide; at 750 R.P.M. it stores 24,000 H.P.-seconds, and at 500 R.P.M. 10,700 H.P.-seconds, the available output being 440 H.P. for half a minute. The overload capacity of all the apparatus is 100 per cent., and the overall efficiency 74 per cent.

In order to avoid the use of low-speed induction motors with a very large number of poles, the author has devised a similar arrangement in which the rotary is replaced by a motor-converter, and the winding or rolling-mill motor supplied from the connections between the rotor and the D.C. armature of the converter, an arrangement which enables the winding motor to be operated at a frequency much lower than that of the line.

Two years ago Mr. Wood described two equalising systems in which A.C. machines were coupled direct to the fly-wheel, without conversion.

* The total energy in a 10-ton fly-wheel running at a peripheral speed of 20,000 ft. per minute is about 750 KW.-minutes, of which only about one-half can be utilised.

The author has also devised a system, suitable for low frequencies —25 cycles or less— in which one or more single-phase commutator motors are direct coupled to a fly-wheel. Fig. 5 shows the system as used on a two-phase circuit. The field of the machine must be supplied with a voltage at right angles to the armature voltage, and this object is attained by supplying the armature of each machine from one phase and its field from the other. The fields are controlled by the automatic regulator shown; alternatively, a variable-ratio transformer may be placed between armature and line.

The current for magnetising the fields of a single-phase machine is considerable, and as it is practically wattless, it has an effect upon the power factor of the line. This objection is overcome by exciting the field from an alternator driven by a synchronous motor. The voltage regulator with this system will be small and easily operated.

Again, the alternating exciter may be connected in series with the line, and arranged so that its voltage may be added to or subtracted from that of the line.

For three-phase circuits two transformers may be used with Scott connection for changing from three-phase to two-phase, and two motors employed, or three motors may be used, one supplied from each phase. The fields may be excited by a three-phase alternator, or from the line through transformers connected to give the proper phase relation between field and armature.

The Chairman (Mr. Miles Walker) said that it was interesting to note that in most of the solutions put forward, the commutating machine was employed. It was required both for obtaining a good torque and also for dealing with the fly-wheel, which in changing speed had both to give and receive power. It was possible to change the speed of an induction motor through a wide range by changing the voltage of the rotor by means of an exciter, which, though dealing with the whole current, did not deal with the whole voltage. The system put forward by Mr. Wood would be a fairly efficient load equaliser, and one which would work at high just as well as at low frequencies.

Mr. H. W. Wilson had had considerable experience in the use of buffer batteries as load equalisers. The great difficulty was the depreciation of the battery. He had recently installed a fly-wheel set in a case where a battery and so-called reversible booster was originally installed and in use for about three years. The battery was entirely destroyed. The fly-wheel set did everything the battery could do, and much more satisfactorily. The working conditions were something like the following, viz., voltage, 550; peak load, 220 amperes; average running load, 80 amperes; and for half the time the load was only 12 amperes. The peak came on instantaneously, and without a battery or a load equaliser of the fly-wheel type, it threw a great strain on the generators, which were gas driven. The load equaliser took about 40 per cent. to 50 per cent. of the peak load comfortably and got the plant over the maximum load, which lasted for between ½ minute and ¾ minute. After that the engine was able to run satisfactorily. The cost of such an equipment was much less than the cost of a battery and booster, and the depreciation was obviously much less.

Mr. V. A. H. McCowen thought the best place to put the equaliser was not at the power station, but in the remote districts where abnormal peaks were experienced. It was a most desirable piece of apparatus to install in connection with small tramways.

Mr C. F. Smith said that the shunt A.C. machine used as a generator had many advantages. They got a constant frequency independent of speed, and by compensating for armature reaction, would get an output almost independent of the power factor. By using a shunt winding of many turns, it might be possible to dispense with the special exciter, especially on a three-phase circuit, where a choice of phases was available for giving different phase relations.

Mr. Eustace Thomas suggested that something might be done towards making the generating plant itself act as its own fly-wheel equaliser, and to make fly-wheels work over a greater range of speed, to supply some of the energy now supplied by an equaliser separately run.

Mr. E. C. McKibbon thought the battery was admirably suited to deal with rapid fluctuations of load, with a quick-acting reversible booster. He did not think the author was correct in stating that a fly-wheel load equaliser was more efficient than a battery. A storage battery working on a rapidly fluctuating load gave an overall efficiency of about 65 per cent. The installation referred to by Mr. Wilson was installed to work a transporter bridge; the plant was gas-driven, but the supply of gas was abominable. When the engineers came to start in the morning, it sometimes took about a quarter of an hour to start up the engines, and as the transporter could not wait for the engines, it had to be run off the battery alone. If the battery was intended as a load equaliser, it naturally deteriorated when used as a main generator. The efficiency of a battery was practically constant throughout its life; it was the capacity which fell.

Mr. J. S. Peck, in reply, said that the equaliser should be placed near the load it had to equalise, as if not it would not equalise the load on the feeders. The fly-wheel equaliser might be useful on small tramway systems, but it depended almost entirely on the nature of the load. The A.C. machine was practically the same in design as a series machine, but was operated shunt instead of series. As to the idea of putting heavier fly-wheels on the generators themselves, that would only be possible with an A.C. system where there was no objection to fluctuations in frequency; with D.C. machines it would be possible to put in an automatic voltage regulator, and permit the speed to drop. A battery was not suitable in a case where the energy stored had to be given up and stored again in a few seconds.

NEW ELECTRICAL DEVICES, FITTINGS, AND PLANT.

Motor Garage Equipments.

Messrs. Ward & Goldstone, of Sampson Works, Salford, have sent us a copy of their latest list (Section M) of electrical accessories for the motor-car and garage. The contents include illustrated descriptions, with prices, of the "valveless" Sherbourne engine, the "Sampson Junior" electric lighting and charging set, batteries, dynamos and switchboards for lighting installations, the "Multum" accumulator charging system, the Primax and Sampson batteries, ignition coils, "Osram" lamps, electric vulcanisers, and various sundries.

The catalogue would be useful to electric light and tramway engineers who have their own motor garage in connection with the outdoor staff &c.

There are listed two small plants for accumulator charging in country garages where the electric lighting supply is not available. These plants have been sold now by Messrs. Ward & Goldstone for

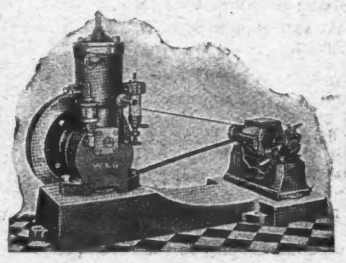


Fig. 1.—The Sherbourne Charging Set.

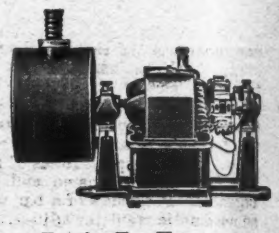


Fig 2.—The Hydranamo.

some years with satisfactory results, and when used with 25 or 50-volt metal-filament lamps they are useful for electric lighting as well as for ignition-accumulator charging. Attention is also called to motor-generators for converting high voltage to a lower voltage and heavier current, suitable for accumulator charging; also to water motors and dynamos, special switchboards, and various devices as used in the motor garage. The Sherbourne charging sets, with valveless engine, have been sold by the firm not only in Great Britain, but in Siam, Hong Kong, Australia, New Zealand and South Africa, during the last four years. We illustrate the "Hydranamo," which consists of water-wheel and dynamo coupled. On a pressure of 40 lb. and over, sufficient current is easily generated to charge an ignition cell; where the pressure is higher, quite a number of cells can be charged.

Watson's Patent Double-Pole Switch and Fuse.

An entirely new departure in switches has recently been put on the market in the form of a combined D.P. switch and fuse. It is constructed in such a way that, provided the switch is in the "off" position, the centre portion which carries the fuses slides away bodily from the base. It is intended for a main switch for small installations up to 10 amperes, for arc lamps and small motors on 250 volts.

The advantage of the arrangement will be apparent to anyone who has had to replace a main fuse in some dark or awkward corner. This switch may be fixed in any position, as to replace a fuse it is only necessary to be able to reach it with one hand.

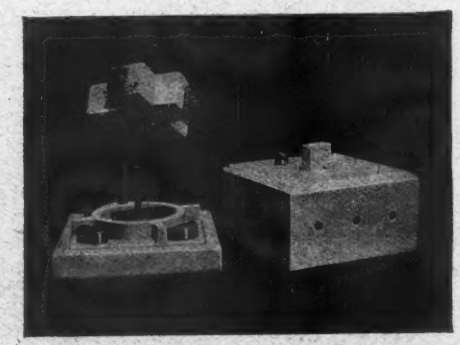


Fig. 3.—Watson D.P. Switch and Fuse.

Continuity through the switch and fuses is only dependent upon four screws, as against twelve in existing apparatus. The usual screws for holding the fuse wire are entirely dispensed with, the fuse wire being drawn in under a spring tongue and pulled back until tight; the spring takes up all contraction and expansion due to heating. Copper fuse wire is used, drawn through asbestos tubing, and arranged in such a way that arcing between poles is an absolute impossibility.

The small space occupied and its neat appearance are points claimed in its favour. It is also stated that the price compares favourably with coupled 10-ampere tumbler switches and separate cut-outs, and a considerable saving is effected in the cost of fixing.

We understand that the device has been tested by several of the leading corporation engineers, and has successfully withstood all tests placed upon it. The makers are The Northern Electrical Co., of Grimsby.

B.T.-H. D.C. Ampere-Hour Meter.

The British Thomson-Houston Co., Ltd., of Rugby, has placed on the market an improved type of mercury ampere-hour meter, type M.H., which possesses material advantages. The characteristic error curve closely approximates to a straight line from the lowest load to full load, the meter starting easily with a load equal to ½ per cent. of its rated capacity. Friction has been reduced to a minimum, so that compounding is unnecessary.

The continued accuracy of a meter is dependent largely on the ratio of the driving torque to the weight of the moving element; this meter has a very high ratio of torque to weight.

The meter is calibrated by altering the electrical circuit, and not by distorting the magnetic field, the former method giving a very permanent calibration; and mercury friction has been practically swamped by working with very high torque and strong braking forces.

The mechanical friction is very small, owing to the extremely light pressure on the jewelled bearing. This is obtained by

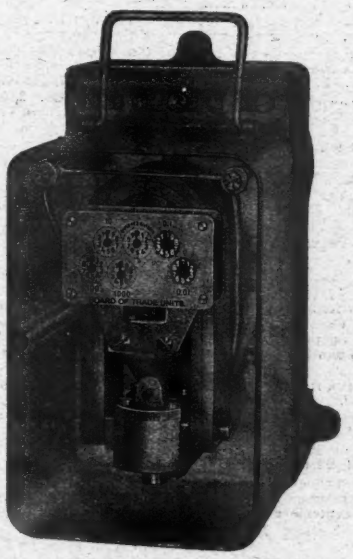


Fig. 4.—B.T.-H. Co.'s Type M.H. Meter.

counterbalancing the weight of the moving element by the thrust of the mercury, thus ensuring long life for the pivot and jewel. The total losses in this meter have thus been reduced to an extremely low figure.

The mercury sealing device is carefully designed, and when sealed for transportation the packing securely clamps the spindle and completely fills the air space around it. This renders it impossible for the mercury to leak, the chamber being completely sealed.

All parts of the meter are made of metal, which will not warp with changes of temperature or excessive heat.

In the electrical circuit there are no butt joints, all being soldered. The resistance cannot, therefore, change due to contact surfaces oxidising; the calibration, once made, is permanent.

All parts are made standard and interchangeable, and should any part become damaged it can be easily replaced from stock.

Type M.H. meters are calibrated to read B. of T. units at any specified pressure up to and including 600 volts.

Magazine Fuse.

The address of Mr. E. Chaudoir, the maker of the device described under this head in our last issue, is 118, City Road—not 48, as stated. The device, which has been patented, has many applications besides the one illustrated; one of its objects is to check the number of fuses blown, and to ensure that the right one is always replaced, no matter how unskilled the operator may be.

Will.—The late Mr. J. T. Harris, for many years managing director of Bullers, Ltd., manufacturers of porcelain electrical fittings, &c., of Hanley, who died on December 8th, left property sworn by his sons, Mr. John Waugh Harris and Mr. Gilbert Harvey Harris, earthenware manufacturers, both of Stone, executors, at £86,783 gross, and £81,612 net.

FOREIGN AND COLONIAL TARIFFS ON ELECTRICAL GOODS.

CANADA.

(*Continued from page* 412.)

"C."

Certificate to be endorsed on postal packages not exceeding $25 in value, the contents of which are not merchandise for sale.

Every article herein to the extent of at least one-fourth of its present value is *bona fide* the produce or manufacture of (1).....

Dated at....., 190

Signature of sender.....

In presence of (2).....

(1) Name of country.

(2) Signature of postal officer.

Note.—Exporters are carefully to observe the above instructions on the margin when making their Certificates on Invoices.

"D."

Being form of combined certificate which may be used on invoices of goods for entry under the British Preferential Tariff.

I, (1).....

hereby certify that I am (2).....

of (3).....

the exporter(s) of the articles included in this invoice, and that I am duly authorised to make and sign this certificate on behalf of the said exporter(s).....

.....

I have the means of knowing and I do hereby certify that this invoice from the said (4)..... to (5).....

amounting to (6).....

.....

.....

is true and correct; and that all the articles included in the said invoice are *bona fide* the produce or manufacture of one or more of the following countries, viz.:—(7).....

.....

and that a substantial portion of the labour of one or more of such countries has entered into the production of every manufactured article included in the said invoice to the extent in each article of not less than one-fourth of the value of every such article in its present condition ready for export to Canada.

That the said invoice contains a true and full statement showing the price actually paid or to be paid for the said goods, the actual quantity thereof, and all charges thereon.

That the said invoice also exhibits the fair market value of the said goods at the time and place of their direct exportation to Canada and as when sold at the same time and place in like quantity and condition for home consumption, in the principal markets of the country whence exported directly to Canada, without any discount or deduction for cash, or on account of any drawback or bounty, or on account of any royalty actually payable thereon, or payable thereon when sold for home consumption but not payable when exported, or on account of the exportation thereof or for any especial consideration whatever:

That no different invoice of the goods mentioned in said invoice has been or will be furnished to any one; and

That no arrangement or understanding affecting the purchase price of the said goods has been or will be made or entered into between the said exporter and purchaser or by any one on behalf of either of them, either by way of discount, rebate, salary, compensation, or in any manner whatsoever other than as shown in the said invoice.

Whereas German goods are subject to a surtax in Canada, I certify that the chief value of none of the articles included in this invoice was produced in Germany.

Signature.....

Dated at .....

this.....day of .....190....

(1) Name of person signing the certificate.

(2) Insert the words partner, manager, chief clerk or principal official, giving rank as the case may be.

(3) Name and address of exporter or exporters.

(4) Name of exporter or exporters.

(5) Name of party or parties to whom articles invoiced.

(6) Insert in words at length the total value of the invoice.

(7) Names of the countries where the articles have been produced or manufactured, being countries entitled in Canada to the benefits of the British Preferential Tariff.

Note.—Exporters are carefully to observe the above instructions on the margin when making their Certificates on Invoices.

Invoices must show the marks and numbers on the packages in such a manner as to indicate truly the quantities and values of the articles comprised *in each* exportation package, the packages to be legibly marked and numbered on the outside when of such a character as to enable such marks and the numbers to be placed thereon. If in any *package* any goods are enclosed which are not included in the invoice of such package, the enclosure (to avoid seizure) should be noted on the invoice of the outside package containing the enclosure, thus—"3 parcels enclosed" (or as the case may be).

(*To be continued.*)

Railway Electrification. — Mr. A. W. Gibbs, General Superintendent of Motive Power of the Pennsylvania Railroad, is reported in the *Railway and Engineering Review* as saying:—"The electric locomotive costs 2 to 2½ times what the steam locomotive does, and that is only the beginning of the cost of electrification. There are power houses and power transmission. . . . Electric motive power for heavy trains at an express speed over long stretches of road still is an impossibility. The railroads are not going to risk millions till they see every problem solved. . . ."

Luckily the world is not all Gibbs, and we have still with us the men who risked their millions in steam railways before they saw every problem solved; and they, and men of a younger generation like them in America, Germany, Scandinavia, Italy and England do not show by their words or actions that they think the electrification of trunk lines an impossibility.

NEW PATENTS APPLIED FOR, 1909.

Compiled expressly for this journal by W. P. Thompson & Co., Electrical Patent Agents, 322, High Holborn, London, W.C., and at Liverpool and Bradford, to whom all inquiries should be addressed.

4,228. "Improvements in electric cut-outs." T. E. Murray. February 20th. (Complete.)

4,248. "Improvements in or connected with variable speed dynamos." H. Leitner. February 20th.

4,259. "Improvements in or relating to electrolytic devices suitable for use as or in the construction of meters, recorders, switches and other apparatus." W. B. Thorpe. February 20th.

4,270. "Improved electric signalling and ringing key." M. S. Conner. February 22nd.

4,271. "Improvements in electro-magnetic counters." M. S. Conner. February 22nd.

4,317. "Improvements in and relating to electric motor starting switches, valves, and like apparatus." Siemens Bros. Dynamo Works, Ltd., and B. G. Payne. February 22nd. (Complete.)

4,353. "Method of and means for protecting metallic articles embedded in the ground from stray earth currents." H. Geppert. February 22nd. (Complete.)

4,367. "Improvements relating to the electric transmission of speech, code signals and the like." A. T. Collier. February 22nd.

4,374. "Improvements in continuous-current dynamo-electric machines." W. Buchanan. February 22nd.

4,376. "Improvements in the manufacture of inductance coils for telephone cables and the like." W. S. Smith and W. P. Granville. February 22nd.

4,377. "Improvements in automatic electric apparatus suitable for advertising purposes." A. E. Voss. February 22nd. (Complete.)

4,399. "Improved electrical relay." M. S. Conner. February 23rd.

4,404. "Improvements in electricity integrating meters." R. Kennedy. (Application for Patent of Addition to No. 9,254, 1908.) February 23rd.

4,416. "Improvements in reducing electric currents for low-voltage incandescent lamps and the like." G. Sweetser. February 23rd.

4,425. "Improvements in or relating to electro-magnetic systems for controlling lights on railway trains, applicable also to the control of valves or taps for other purposes." Siemens Bros. Dynamo Works, Ltd., F. G. Broadhead and S. Hawkins. February 23rd. (Complete.)

4,459. "Improvements in and relating to electrically-heated cooking ranges or stoves." C. Fonteyn. February 23rd.

4,472. "Improvements in and relating to controllers for dynamo-electric motors." Allgemeine Elektricitats-Gesellschaft. (Date applied for under Sec. 91 of the Act, February 24th, 1908, being date of application in Germany.) February 23rd. (Complete.)

4,480. "Relay for telephone and weak alternating currents." A. Nikiforoff. February 23rd.

4,501. "Improvements in telephone sub-station systems." W. Aitken. February 24th.

4,527. "Improved method of electric lighting." C. S. Fearon and H. L. Burke. February 24th. (Complete.)

4,553. "Electric furnace." Aktiebolaget Elektrometall. (Date applied for under Sec. 91 of the Act, March 10th, 1908, being date of application in Sweden.) February 24th. (Complete.)

4,560. "Improvements relating to metallic conduits as employed for electric wiring." F. W. Bayliss. February 24th.

4,576. "Carbonic-acid engine in which the carbonic acid is heated by electricity." L. Horst. February 24th. (Complete.)

4,594. "Improvements relating to electro-magnetically operated switches, relays, and the like, particularly applicable in telephone exchanges." Siemens Bros. & Co., Ltd. (Siemens & Halske Akt.-Ges., Germany.) February 24th. (Complete.)

4,611. "Improvements in or connected with electric lamps." H. Terry and G. D. Mann. February 25th.

4,614. "Improvements in electric switches." A. Willis. February 25th.

4,630. "Improvements in the construction of telephone and switchboard lamp jacks." M. S. Conner. February 25th.

4,641. "Improved method and apparatus for separating metal combinations from the gangue of minerals and from each other by electro-magnets." Industrial and Mineral Research Syndicate, Ltd., and J. Moeller. February 25th.

4,652. "Improvements in and relating to single-phase alternating current electric commutator motors." Maschinenfabrik Oerlikon. (Date applied for under Sec. 91 of the Act, February 25th, 1908, being date of application in Germany.) February 25th. (Complete.)

4,672. "Improvements in or relating to electrical heating apparatus." A. F. Berry. February 25th.

4,673. "Improvements in or relating to electrical heating apparatus." A. F. Berry. February 25th.

4,677. "Improved textile fabrics having electrical and other properties." H. P. Pearson. February 25th.

4,690. "Improvements in vapour lamps." W. Fairweather. (Landers, Frary & Clark, United States.) (Date applied for under Rule 13, September 19th, 1908. An invention comprised in application No. 1,979, dated September 19th, 1908.) February 25th. (Complete.)

4,694. "Improvements in connection with electric lamps." C. H. Stearn and C. F. Topham. February 25th.

4,703. "Improvements in and relating to magnetic ore separators." F. W. C. Stachow. February 25th. (Complete.)

4,704. "Improvements in protective devices for electric generating and distribution systems and apparatus." British Thomson-Houston Co., Ltd. (Allgemeine Elektricitats-Ges., Germany.) February 25th.

4,705. "Improvements in and relating to protective devices for alternating current systems." Allgemeine Elektricitats-Ges. (Date applied for under Sec. 91 of the Act, February 25th, 1908, being date of application in Germany.) February 25th. (Complete.)

4,762. "Improvements in and relating to apparatus for producing electrical oscillations of high frequency." W. Peukert. (Date applied for under Sec. 91 of the Act, March 17th, 1908, being date of application in Germany.) February 26th. (Complete.)

4,801. "Improvements in directed wireless telegraphy." E. Bellini and A. Tosi. (Date applied for under Sec. 91 of the Act, March 7th, 1908, being date of application in France.) February 26th. (Complete.)

4,825. "Improvements in and relating to electric switches." B. N. Dadge. February 27th.

4,863. "Magnetic locking device for locking railway carriage doors, safes, or for other purposes." G. P. Fairless and W. T. Dixon. February 27th. (Complete.)

4,882. "Improvements in automatic regulators for electric circuits." British Thomson-Houston Co., Ltd. (General Electric Co., United States.) (Application for Patent of Addition to No. 5,087, 1907.) February 27th. (Complete.)

4,888. "Improvements in apparatus for wireless telegraphy, wireless telephony, and the disperal of fog and smoke by means of electro-magnetic waves." M. Micheluzzi. February 27th.

4,909. "Improvements relating to watt-hour meters." E. Grassot. (Date applied for under Sec. 91 of the Act, July 31st, 1908, being date of application in France.) February 27th. (Complete.)

PUBLISHED SPECIFICATIONS.

Copies of any of these Specifications may be obtained of Messrs. W. P. Thompson & Co., 322, High Holborn, W.C., and at Liverpool and Bradford; price, post free, 9d. (in stamps).

1907.

Flanged Traction Wheels for Use Chiefly with Electric Tramcars and the like. Mountain & Gibson, Ltd., and W. Renison. 28,164.

Apparatus for Electrically Igniting Miners' Safety Lamps or the like. E. A. Hailwood. 28,255.

Apparatus for the Automatic Distribution of Telegraphic Messages. A. Lemoine. 24,197. November 1st.

Electrical Distribution Systems wherein Transformers are Employed. H. M. Hobart, F. B. Cramer and R. Coad. 28,652. December 30th.

1908.

Electric Ignition Devices for Explosion Engines. Societe d'Electricite Nilmelior. 24,241. November 11th. (Date applied for under International Convention, December 16th, 1907.)

Electric Ignition Devices for Internal-Combustion Engines. J. E. B. Brown and J. A. Ross. 24,711. November 17th.

Electrolytic Cells. A. E. Gibbs. 28,147. December 24th. (Date applied for under Rule 13, December 17th, 1907.)

Magneto-Electric Ignition Apparatus. Firm of R. Bosch. 28,548. December 31st. (Date applied for under International Convention, September 25th, 1908.)

Electric Furnaces. British Thomson-Houston Co. (General Electric Co., United States.) 1,470. January 21st.

Apparatus for Alternative Wireless Telegraphy and Telephony. J. Schiessler. 1,848. January 27th.

Machines or Apparatus for Reproducing in Ordinary Characters Telegraphic or other Messages or Intelligence in the Form of Perforations in a Tape. F. G. Creed and W. A. Coulson. 1,947. January 28th.

Radio-Telegraphy. Amalgamated Radio-Telegraph Co. 2,206. January 31st. (Date applied for under International Convention, January 31st, 1907.)

Dynamo-Electric Machines. British Thomson-Houston Co. (General Electric Co., United States.) 2,244. January 31st.

Method of Operating Electric Switches. B. M. Drake, A. Barnes and Drake and Gorham, Ltd. 2,281. February 1st.

Mono-Telephone Relays. Soc. des Telegraphes Multiplex. (Systeme E. Mercadier.) 6,928. March 28th. (Application for Patent of Addition to No. 6,767 of 1908.)

Cooling or Ventilating Dynamo-Electric Machines. J. P. Hall. 7,854. April 9th.

Electricity Meters. Chamberlain & Hookham, Ltd., and S. H. Holden. 10,893. May 19th.

Electric Switches. F. H. Headley, W. H. Walton and E. Lawley-Pinching. 12,170. June 4th.

Telephonic or like Calling Apparatus. C. H. Ellison and C. M. Jacobs. 12,507. June 10th. (Application for Patent of Addition to No. 19,908 of 1907.)

Connection for the Electrodes of Electric Furnaces. C. A. Keller. 12,634. June 12th.

Construction of Electric Arc Lamps having Inclined Carbons. Veritys, Ltd., and H. Worsley. 14,982. July 15th.

Armouring of Flexible Electric Trailing Cables or the like. British Insulated & Helsby Cables, Ltd., and F. A. Cole. 15,641. July 23rd.

Mounting Telephonic Microphones. V. Tardieu. 16,788. August 10th.

Rotary Interrupters for Magneto-Electric Ignition Devices. A. Zähringer. 18,756. September 7th. (Date applied for under Rule 13, March 30th, 1908.)

Telegraphic Relays. I. Kitsee. 20,360. September 28th.

Signalling Telegraphs. Siemens Bros. & Co. (Siemens & Halske Akt.-Ges.) 20,600. September 30th.

Telephone Instruments. W. R. Daniels. 20,671. October 1st. (Date applied for under International Convention, April 10th, 1908.)

Method of and Apparatus for Indicating and Locating Faults in Systems of Conductors for High-Tension Electricity. C. Linke. 22,215. October 20th.

Lifeguards and Obstruction Removers for Electric Tramcars. A. Gollnick. 24,222. November 11th.

Guard for the Overhead Contact Roller of Electric Tramcars. R. Kutscher. 24,529. November 14th.

Electric Accumulators. Van Raden & Co. and M. Metz. 25,264. November 24th. (Date applied for under Rule 13, February 7th, 1908.)

Hot-Wire Electric Current Measuring Instruments. Hartmann & Braun Akt.-Ges. 26,449. December 7th. (Date applied for under International Convention, March 6th, 1908.)

Hot-Wire Electric Current Measuring Instruments. Hartmann & Braun Akt.-Ges. 26,450. December 7th. (Date applied for under International Convention, March 6th, 1908.)

Mode of Manufacture of Electrical Resistances. P. S. Brook and J. A. Hirst. 1,491. January 22nd. (Post-dated July 22nd, 1908.)

Hauling Gear for Electric Hauling Machines. M. Archer. 2,163. January 30th.

Electric Current Generators. W. J. Still. 2,411. February 3rd.

Relay Devices for Electric Circuits. North and Orchard. 2,581. February 5th.

Electrically-Fired Small Arms. H. Whittington. 2,629. February 6th.

Reduction of Metallic Compounds and Furnaces Therefor. British Thomson-Houston Co. (General Electric Co., United States.) 4,644. February 29th.

Electrically-Controlled Gas Lighting Devices. G. H. Maddick. 4,885. March 4th.

Electric Arc Lamps. A. D. Jones. 4,977. March 5th.

Fixing of Insulators to the Arms of Poles and the like. G. Horn. 7,490. April 4th.

Means for Preventing the Corrosion of the Internal Parts of Boilers Due to Electrochemical Action. R. E. G. Cumberland. 8,422. April 15th.

Electrodes for the Application of High-Frequency Electric Currents. R. Houghton. 9,042. April 25th.

System of Heating by Electricity and Apparatus for Use in Connection Therewith. T. J. Rorke and E. Rorke. 9,481. May 1st.

Starting Devices for Electric Motors. M. Kallmann. 9,859. May 6th. (Date applied for under International Convention, August 1st, 1907.)

Electric Incandescent Lamp Filaments. British Thomson-Houston Co. (General Electric Co., United States.) 10,500. May 15th.

Electrical Ignition Apparatus for Internal-Combustion Engines. H. Bevis and H. J. Coates. 10,918. May 20th.

Alternating-Current Electromagnet. D. L. Lindquist. 11,806. May 30th.

Terminals or Contact Pieces and Means for Securing Same to Electric Insulators. A. J. Boult. (Benjamin Electric Manufacturing Co.) 14,411. July 7th.